H45

HANDHELD
MULTIMETTER

H45 SERIES

V.1.20

User manual

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1.- INSTALLATION

1.1.- SAFETY RECOMMENDATIONS

- The **unspecified use of the equipment** does not ensure its protection.
- If the external DC adaptor is a **class I** device, for security reasons it should be connected to **properly grounded supply lines**.
- This equipment can be used in **Excess Voltage Category II** installations and **Pollution Degree 2** environments.
- If any of the following accessories are used, use only the **specified types** for safety reasons:

  Rechargeable battery
  External DC Adaptor

- Always bear in mind the **specified margins** both for power supply and measurement.
- Remember that **rms** voltages over **60 V DC** or **30 V AC** are potentially dangerous.
- At all times maintain the **maximum environmental conditions specified** for the apparatus.
- The operator **is only authorized to intervene** in order to replace the battery. The Maintenance section gives specific instructions for this procedure.
- Any other change in the equipment must be carried out exclusively by specialized personnel.
- When using the external DC adaptor, the **measure negative** should be at earth potential.
- **Do not obstruct the ventilation system** of the equipment.
- For input/output of the signal, especially when handling high levels, use appropriate cables with low radiation level (e.g. T-100 by Televés).
- Strictly comply with the **cleaning recommendations** described in the Maintenance section.

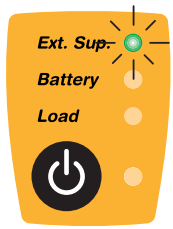
1.2.- POWER SUPPLY

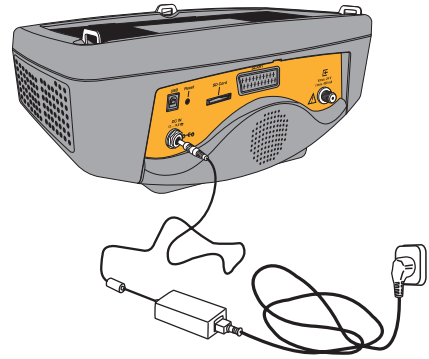
The **H45** has two functioning modes: using **external powering** and using its ***battery***.

1.2.1.- External powering

A DC adaptor is provided with the equipment, enabling its connection to the power grid, both for its operation and battery charging. It is lodged in a special section of the equipment carry case. To connect the equipment to the mains, you should connect the adaptor to the power connector at the top, where all the connectors are located.

When the equipment is connected to the power grid, the LED **Ext. Sup.** lights up. (This can be seen in figure).





- Connection to the mains -

1.2.2.- Battery

A Lithium battery with nominal tension 7.2V and 9 A/H is supplied with the **H45**. This battery, with combined average consumption, gives the equipment ***over 4 hours of autonomy***.

The equipment incorporates a complex battery charging and discharging system that optimizes its duration and active life, preventing sudden reductions of the equipment's autonomy over time.

To charge the battery, the equipment must be connected to the power grid using the DC adaptor (see previous section).

The battery management system will automatically initiate charging and will handle the end of the process.

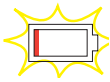
However, at any time, by pressing the ***key for 3 seconds, the charging process can be interrupted.***

To restart the process, press the same key again. Charging will also restart if external powering is disconnected and reconnected or if the equipment is turned off.

The equipment carries out a continuous monitoring of battery status informing the user of the battery charge through an icon, a LED (Battery) and a sound signal.

When the battery is totally ***charged***, the inside of the icon is ***completely orange***. As the battery goes discharging, the orange filling reduces, leaving the battery ***empty (transparent)***.

The icon shows 5 stages, approximately representing the battery charge:

 ⇒ Battery charge less than 5%. Empty icon, blinking red at bottom (if not outer power is connected) and low battery sound alarm.

⇒ Battery charge more than 5% and less than 25%

⇒ Battery charge more than 25% and less than 50%

⇒ Battery charge more than 50% and less than 75%

⇒ Battery charge more than 75%.

The LED reports on battery status during the charging process. This LED's blinking time will be a function of the battery charge level.

While the charge level is under 25%, the LED will be on for 500 msec and off for 2.5 sec. As it charges, the on time will go increasing and the off time diminishing. When the charge reaches 75%, the LED will stay on for 2.5 sec and off for 500 msec. When it is completely charged, the LED will remain permanently on while the equipment is in use.

If the battery charge drops below 5%, the icon filling will appear in red, and the equipment will begin to beep and show a low battery message on the display.

If the discharging process continues, the equipment will issue warnings every 10 seconds that it is turning off, and if external powering is not connected before 30 seconds go by, it will finally turn off.

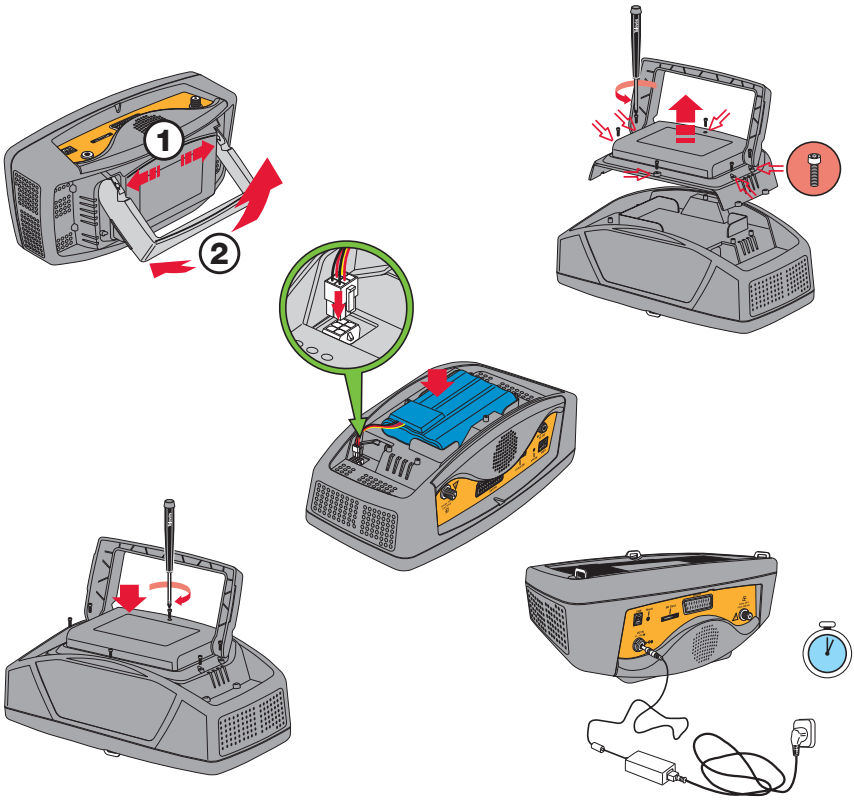
The charging process, starting from a completely discharged battery, will last for 8 hours.

With a charging time of 3 hours, the battery will be 75% charged.

If the charging management system detects any condition preventing the initiation of the charging process, the latter will not start. This may occur due to excessive battery temperature, maximum charging time, ...

To change the battery, take the following steps:

⇒ Disassembling the plastic lid of the lower part of the equipment. Remove the 6 screws.
⇒ Change the battery and connecting.
⇒ Covering the battery again.
⇒ Connecting the DC power for 8 hours to charge the battery.



- Change the battery -

Recommendations on battery charge:

⇒ If this can possibly be avoided, it is recommended that the battery not be allowed to discharge completely.

⇒ If the equipment is to be stored for a long period of time, it is recommended the battery not be stored at a low charge level. The stored battery will gradually discharge, so it is recommended that it be charged every 2 or 3 months if stored at a room temperature of 25º.

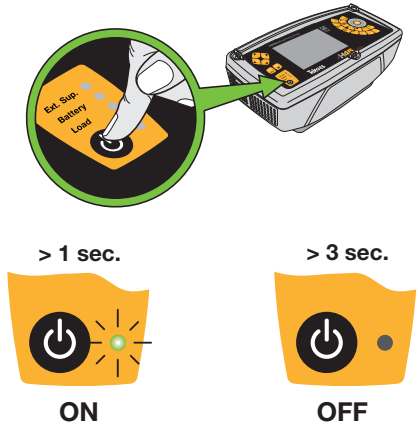
⇒ The battery charge should always be done with the battery placed in the meter and using the DC adaptor supplied with the equipment or powering it with DC voltage within the specified range (12V-15V). This is the only way to guarantee its durability and active life.

1.3.- STARTUP

To start up the equipment, press the ON button. Once this has been pressed, all the equipment's LEDs will be illuminated for a few seconds. During this interval, the meter will show the Televés logo and the software version of the equipment.

After a few seconds, all the LEDs except that which shows the equipment is on will go out.

If the equipment is connected to the power grid, the LED **Ext. Sup.** will also be lit up (green) and if the battery is loading, the LED **Battery** (green) will blink.



- Startup -

2.- FEATURES

The following is a list of the main features

• Included
O Optional
x Not available

Reference	5990	599001	599002	599003	599004	5992	599201	599202	599203	599204
Languages										
Spanish, English, French, German, Italian, Portuguese, Polish, Russian	•	•	•	•	•	•	•	•	•	•
Working Bands										
Return (5-47MHz)										
Measure and demodulation DVB-C/T & analogs	x	x	x	x	x	•	•	•	•	•
FM (80-110MHz)										
Measure and demodulation	•	•	•	•	•	•	•	•	•	•
Terrestrial (47-880MHz)										
Measure and demodulation DVB-T/C/H & analogs	•	•	•	•	•	•	•	•	•	•
Measure and demodulation DVB-T2	x	x	x	x	x	O	O	O	O	O
GSM (860-950MHz)										
Measure in spectrum	x	x	x	x	x	•	•	•	•	•
Satellite (950-2220Mhz)										
Measure in analog. Measure & demod. DVB-S	•	•	•	•	•	•	•	•	•	•
Measure & demod. DVB-S2	O	•	•	O	•	•	•	•	•	•
WiFi(2220-2500MHz)										
Measure in spectrum	x	x	x	x	x	•	•	•	•	•
Espectro Extendido (3,3GHz)										
Measure in spectrum	x	x	x	x	x	O	O	O	O	O
Dinamic range										
Terrestrial										
50dB	•	•	•	•	•	•	•	•	•	•
60dB	x	x	x	x	x	•	•	•	•	•

Reference	5990	599001	599002	599003	599004	5992	599201	599202	599203	599204
Satellite										
45dB	•	•	•	•	•	•	•	•	•	•
55dB	x	x	x	x	x	•	•	•	•	•
Measurements and applications										
Viewing: Analyzer, TV, Combo (Analyzer, TV & simultaneous measures)	•	•	•	•	•	•	•	•	•	•
Standard Multinorm: PAL (B,G,D,K,I) SECAM (B, G, D, K, L)	•	•	•	•	•	•	•	•	•	•
Units: dBµV, dBmV, dBm, dBµV/m	•	•	•	•	•	•	•	•	•	•
Standard precision: +-1dB(ter) y +-2dB(sat)	•	•	•	•	•	•	•	•	•	•
Quality checkmarks	•	•	•	•	•	•	•	•	•	•
Power voltage and previous: 5,13, 18 & 24V	•	•	•	•	•	•	•	•	•	•
ExtraBurst: 14 & 19,5V	•	•	•	•	•	•	•	•	•	•
Tone LNB 22KHz	•	•	•	•	•	•	•	•	•	•
Diseqc	•	•	•	•	•	•	•	•	•	•
SCR	•	•	•	•	•	•	•	•	•	•
Motor control	x	x	x	x	x	•	•	•	•	•
Analog										
Level (-15-130dBµV)	•	•	•	•	•	•	•	•	•	•
V/A	•	•	•	•	•	•	•	•	•	•
C/N Automatic (Hasta 45dB)	•	•	•	•	•					
C/N Automatic (Hasta 52dB)	x	x	x	x	x	•	•	•	•	•
C/N Line (15-52dB)	•	•	•	•	•	•	•	•	•	•
Level Bar	•	•	•	•	•	•	•	•	•	•
Synchronism	•	•	•	•	•	•	•	•	•	•
Teletext	•	•	•	•	•	•	•	•	•	•
Line	x	x	x	x	x	•	•	•	•	•
Digital										
Power (15-130dBµV)	•	•	•	•	•	•	•	•	•	•
C/N Automatic	•	•	•	•	•	•	•	•	•	•
DVB-T CBER (9.9E-2 – 1.0E-6)	•	•	•	•	•	•	•	•	•	•
DVB-T VBER (1.0E-3 – 1.0E-8)	•	•	•	•	•	•	•	•	•	•
DVB-T MER	•	•	•	•	•	•	•	•	•	•

Reference	5990	599001	599002	599003	599004	5992	599201	599202	599203	599204
DVB-T Power (40-125dBµV)	•	•	•	•	•	•	•	•	•	•
DVB-T Echos	O	•	•	O	•	•	•	•	•	•
DVB-T Constellation	O	•	•	O	•	•	•	•	•	•
DVB-T MPEG2	•	•	•	•	•	•	•	•	•	•
DVB-T MPEG4	O	•	•	O	•	O	•	•	O	•
DVB-T CAM	O	O	•	O	O	O	O	•	O	•
DVB-T2 Link Margin (-1 - 10dB)	×	×	×	×	×	O	O	O	O	O
DVB-T2 LDPCBER (1.0E-2 – 1.0E-6)	×	×	×	×	×	O	O	O	O	O
DVB-T2 BCHBER	×	×	×	×	×	O	O	O	O	O
DVB-T2 MER	×	×	×	×	×	O	O	O	O	O
DVB-T2 Power	×	×	×	×	×	O	O	O	O	O
DVB-T2 Constellation	×	×	×	×	×	O	O	O	O	O
DVB-T2 MPEG2	×	×	×	×	×	O	O	O	O	O
DVB-T2 MPEG4	×	×	×	×	×	O	O	O	O	O
DVB-T2 CAM	×	×	×	×	×	O	O	O	O	O
DVB-C BER(1.0E-2 – 1.0E-8)	•	•	•	•	•	•	•	•	•	•
DVB-C MER	•	•	•	•	•	•	•	•	•	•
DVB-C Power (40-125dBµV)	•	•	•	•	•	•	•	•	•	•
DVB-C Constellation	O	•	•	O	•	•	•	•	•	•
DVB-C MPEG2	•	•	•	•	•	•	•	•	•	•
DVB-C MPEG4	O	•	•	O	•	O	•	•	O	•
DVB-C CAM	O	O	•	O	O	O	O	•	O	•
DVB-S CBER (1.0E-2 – 1.0E-6)	•	•	•	•	•	•	•	•	•	•
DVB-S BER(1.0E-4 – 1.0E-8)	•	•	•	•	•	•	•	•	•	•
DVB-S MER	•	•	•	•	•	•	•	•	•	•
DVB-S Power(40-120dBµV)	•	•	•	•	•	•	•	•	•	•
DVB-S MPEG2	•	•	•	•	•	•	•	•	•	•
DVB-S MPEG4	O	•	•	O	•	O	•	•	O	•
DVB-S CAM	O	O	•	O	O	O	O	•	O	•
DVB-S2 Link Margin (-1 – 10dB)	O	•	•	O	•	•	•	•	•	•
DVB-S2 CBER (1.0E-2 – 1.0E-8)	O	•	•	O	•	•	•	•	•	•
DVB-S2 BCH BER(5.0E-2 – 1.0E-8)	O	•	•	O	•	•	•	•	•	•

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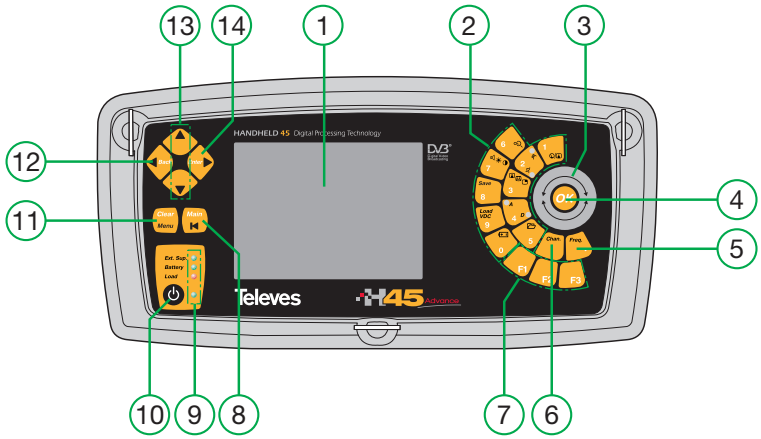
Reference	5990	599001	599002	599003	599004	5992	599201	599202	599203	599204
DVB-S2 MER	O	•	•	O	•	•	•	•	•	•
DVB-S2 Power (40-120dBµV)	O	•	•	O	•	•	•	•	•	•
DVB-S2 Constellation	O	•	•	O	•	•	•	•	•	•
DVB-S2 MPEG2	O	•	•	O	•	•	•	•	•	•
DVB-S2 MPEG4	O	•	•	O	•	O	•	•	O	•
DVB-S2 CAM	O	O	•	O	O	O	O	•	O	•
Optics										
λ: 1310nm, 1490nm, 1550nm	O	O	O	•	•	O	O	O	•	•
Units: dBm, mW(µW), dB	O	O	O	•	•	O	O	O	•	•
Programmed Measures										
Memories	•	•	•	•	•	•	•	•	•	•
Macromeasures	•	•	•	•	•	•	•	•	•	•
Scan&Log	•	•	•	•	•	•	•	•	•	•
Instant Log	•	•	•	•	•	•	•	•	•	•
DataLogs	•	•	•	•	•	•	•	•	•	•
Graphics	X	X	X	X	X	•	•	•	•	•
Analyzer										
Terrestrial SPAN: 5,10,20,50,100,200,500 & FULL	•	•	•	•	•	X	X	X	X	X
Terrestrial SPAN: 200, 500KHz, 1,2MHz,...,1, 1.5GHz, 2GHz & FULL	X	X	X	X	X	•	•	•	•	•
Satellite SPAN: 5,10,20,50,100,200,500 & FULL	•	•	•	•	•	X	X	X	X	X
Satellite SPAN: 200, 500KHz, 1,2MHz,...,1, 1.5GHz, 2GHz & FULL	X	X	X	X	X	•	•	•	•	•
Terrestrial RBW: 100, 200, 800 & 3200KHz	•	•	•	•	•	X	X	X	X	X
Terrestrial RBW: 300, 600Hz, 1.5, 3, 6, 12, 24, 100, 200, 400, 800KHz, 1.6, 3.2MHz	X	X	X	X	X	•	•	•	•	•
Satellite RBW: 200, 800 & 3200KHz	•	•	•	•	•	X	X	X	X	X
Satellite RBW: 200, 400, 800KHz, 1.6, 3.2MHz	X	X	X	X	X	•	•	•	•	•
RBW Auto based on SPAN	•	•	•	•	•	•	•	•	•	•
Vertical reference level: 5, 10dB	•	•	•	•	•	X	X	X	X	X
Vertical reference level: 1, 2, 5 & 10dB	X	X	X	X	X	•	•	•	•	•
Real time sweep speed <250ms	•	•	•	•	•	X	X	X	X	X
Real time sweep speed <10ms	X	X	X	X	X	•	•	•	•	•

Reference	5990	599001	599002	599003	599004	5992	599201	599202	599203	599204
Screen refresing speed <250ms	•	•	•	•	•	×	×	×	×	×
Screen refresing speed <100ms	×	×	×	×	×	•	•	•	•	•
Maximum/Minimum	•	•	•	•	•	•	•	•	•	•
Mark 1	•	•	•	•	•	×	×	×	×	×
Mark 3	×	×	×	×	×	•	•	•	•	•
Input/Output										
Screen: TFT 5"	•	•	•	•	•	•	•	•	•	•
Scart	•	•	•	•	•	•	•	•	•	•
HDMI	O	•	•	O	•	O	•	•		•
SD Card	×	×	×	×	×	•	•	•	•	•
Scart & speaker incorporated	•	•	•	•	•	•	•	•	•	•
RF connector F/F Interchangeable	•	•	•	•	•	•	•	•	•	•
External Power	•	•	•	•	•	•	•	•	•	•
Mechanical/environmental specifications										
Weight (2Kgrs without battery)	•	•	•	•	•	•	•	•	•	•
Dimensions: 306x150x125mm	•	•	•	•	•	•	•	•	•	•
Altitude: Hasta 2000m	•	•	•	•	•	•	•	•	•	•
Temperature range: De 0 a 40°C	•	•	•	•	•	•	•	•	•	•
Maximum relative humidity: 80% (Hasta 31°C), Decreasing linearly up to 50% at 40% C.	•									
		•	•	•	•	•	•	•	•	•
Maximum consumption: 42W	•	•	•	•	•	•	•	•	•	•
Updates/Options										
5991 HD COMPACT	•	×	×	•	×	×	×	×	×	×
5994 Upgrade Compact to Advance	•	•	•	•	•	×	×	×	×	×
5996 Return channel	•	•	•	•	•	×	×	×	×	×
5997 MPEG4	•	•	×	•	×	×	×	×	•	×
5998 CAM	•	×	×	•	×	•	•	×	•	×
5999 Optical Receiver	•	•	•	×	×	•	•	•	×	×
598901 DVB-T2	×	×	×	×	×	•	•	•	•	•
598902 Extended Spectrum 3,3GHz	×	×	×	×	×	•	•	•	•	•
5909 Calibration Certificate	O	O	O	O	O	O	O	O	O	O

2.1.- METER COMPONENTS DESCRIPTION

On the front panel we have the following components:



- Front panel -

(1) Monitor

5" color TFT screen

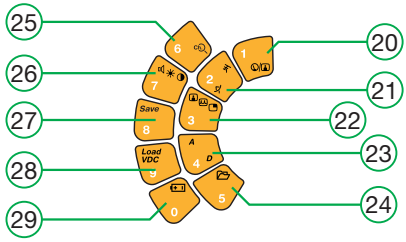
(2) Numerical keyboard and quick keys.

The numerical keyboard permits the introduction of the numerical values required (frequency, channel, symbol rate values, ...).

Further on, the following symbol will be used ***to indicate the parameters whose values may be introduced using the numerical keyboard.***

Besides, some of the ***numerical keys are also quick keys for certain frequently-used functions***.

The paragraphs below provide a detailed explanation of all the functions, and those possessing a quick key will be indicated by a symbol on the respective key.

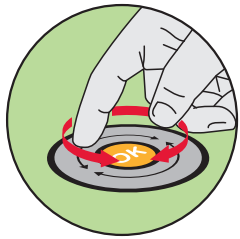


- Numerical keyboard -

(3) (rotating selector)

Depending on what part of the menu we are in, it will have one function or another. For example, if we have opened a parameter selection window, it will allow us to switch to select our option of choice. It may also be used to change channels (channel mode), or tune in on a different frequency (frequency mode).

In the paragraphs below that explain the meter functions in detail, the following symbol will be used to indicate the parameters that may be selected by using the rotating selector.



- Rotating selector -

(4) Parameter Acceptance. Key

The key ***confirms the introduction of the parameter***. If we are browsing through the menus, it will also give us ***access to the selected sub-menu.***

(5) Key

This selects the frequency tuning mode. Just as in the above case, if there is any measuring window open, and the equipment has been set to channel tuning mode on

pressing the key

, the tuned channel information will disappear, showing in its stead the video carrying frequency for that channel if it is in analog mode, or the central channel frequency, if it is in digital mode.

Once the equipment is in frequency tuning mode, if we press this key again, the tuned frequency will be erased, allowing us to introduce the frequency we want to tune in on, using the numerical keyboard. To insert the decimal point, we simply press the same key again.

To erase any character, we can press the key

. To validate the frequency we have just introduced on the keyboard, we can press key

.

f we maintain pressure on button

in satellite mode, use of Real Frequency alternates with IF.

(6) Key

This selects the channel tuning mode. If a measuring window is open, it will display the channel that has been tuned. If there is no window open, the window for the last measurement made will automatically open.

Once in channel tuning mode, if we press the key

again, we will be able to introduce the desired channel by keying in its name (number characters only) with the key

.

In satellite mode by steady pressure on key

we can commute between real and FI frequency.

(7) Keys

(Quick guide)

By pressing key

we will access a quick guide to the keys and their functions.

(8) Key

Pressing this key returns us to the main menu. If the menu is not visible, punching the key again will make it so. All subsequent punches will return us to the ***main menu***.

(9) (Status LEDs)

(Ext. Supply): Indicates if the equipment is being powered externally.

(Battery): Indicates if the battery is charging, and if so, its charging status. ***While the charging process continues, this LED will blink***.

(Load): ***Indicates if the equipment is powering external devices***. It is the only red LED with the intention of warning the installer of this situation.

(ON): Indicates whether the equipment is on.

(A): Indicates the equipment is in analog mode (analog measures and de-modulation).

(D): Indicates the equipment is in digital mode (digital measures and de-modulation).

(Terrestrial): Indicates the equipment is working on the terrestrial frequency band.

(Satellite): Indicates the equipment is working on the satellite frequency band.

(10) Key

The startup key. ***To turn the equipment off, this key should be pressed for over 3 seconds***.

(11) Key

It makes the menu buttons appear and disappear on the screen. Likewise, it is also used to close the windows appearing in the middle of the screen ***(parameter selection windows)*** and to cancel parameters when keyboard values are being inserted.

(12) Key

This key has two functions: if the user is introducing data with the numerical keyboard (frequency or code), the function of this key is to ***erase the last digit written***. If we are in a parameter selection window, it closes. Another function of this key is to ***return to the last menu used***.

(13) Keys

These are used to browse up/down through the menus and lists.

(14) Key

It is used to access the selected sub-menu.

(20) Key

SHORT PRESS:

TV MODE: Allows one to modify the OSD type that appears on screen.

LONG PRESS (Press and hold the key):

TV MODE: In digital terms, it switches between BER visualization and MPEG.

ANALYZER: It switches between normal and zoom spectrum (Option)

(21) Key

SHORT PRESS:

GENERAL: Switches between satellite and terrestrial.

LONG PRESS (Press and hold the key):

GENERAL: Switches between FM, terrestrial and satellite.

(22) Key

SHORT PRESS:

TV MODE: Switches between Analyzer , Combo Mode and TV mode.

LONG PRESS (Press and hold the key):

TV MODE: Switches between TV mode, Combo Mode and Analyzer.

(23) Key

SHORT PRESS:

GENERAL: Switches between analogue and digital.

LONG PRESS (Press and hold the key):

TV MODE: **TERRESTRIAL.** Allows one to activate the analogue/ digital channel identification mode.

SATELLITE: In BER satellite mode it allows one to switches between DVB-S and DVB-S2 (Option).

ANALYZER: Allows one to measure the BER in the analyzer (Option).

(24) Key

SHORT PRESS:

GENERAL: Opens up the memory listing for the meter. Direct access to Macro-measurements, Data logs, ILOGS.

Graphs (Option) and SD Option).

LONG PRESS (Press and hold the key):

GENERAL: Direct access to SCANLOG.

(25) Key

SHORT PRESS:

TV MODE: Next channel search.

ANALYZER: Satellite identification.

LONG PRESS (Press and hold the key):

TV MODE: Previous channel search.

(26) Key

SHORT PRESS:

GENERAL: Access to the screen controls.

LONG PRESS (Press and hold the key):

GENERAL: Access to the satellite positioning function.

(27) Key

SHORT PRESS:

TV MODE: Records ILOG screen measurements.

In echo visualisations it records the trace Option) .

ANALYZER: Records a graphic (Option) .

(28) Key

SHORT PRESS:

GENERAL: Preamplifier power. Access to Extra Burst, Diseqc, SCR and machine controls (Option).

(29) Key

SHORT PRESS:

GENERAL: Energy Management.

LONG PRESS (Press and hold the key):

GENERAL: Start or stop battery charging.

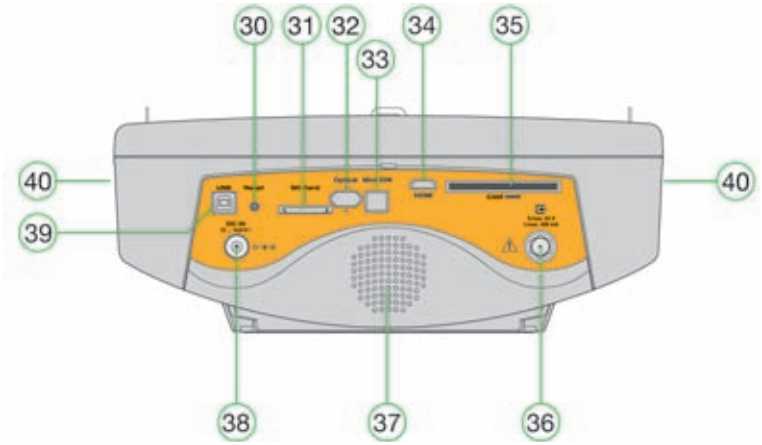
Providing external power is connected to the equipment, battery charging will take place. ***If we interrupt the battery charging process by pressing the following key for more than 3 seconds***

, the battery charge will not reinitiate until we again press the same key for more than 3 seconds

, turn off the equipment, or disconnect and reconnect the equipment power.

If the temperature is very high, the charging process will not start in any case, and if it had previously started, once the temperature reaches a certain threshold, the process will abort and resume automatically when the temperature returns to previous values.

At the top we have the following items:



- Connectors panel -

(30) Reset button

This enables the restarting of the equipment in the case of malfunction. When the equipment is reset it acquires the status it had the last time it was shut down normally.

To activate this button, a non-piercing object must be used at adequate pressure.

(31) SD Card (Option)

SD Card Slot.

(32) Optical (Option)

(33) Mini-DIN (Option)

(34) HDMI (Option)

(35) CAM (Option)

CAM module slot.

(36) RF Input

Signal input connector with 75 ohm impedance.

(37) Loudspeaker

(38) Power

External input power 12 – 14.8 V.

(39) USB port

Connection to PC to use the **HSuite** program and/or meter software updating.

On the sides we have:

(40) Ventilators

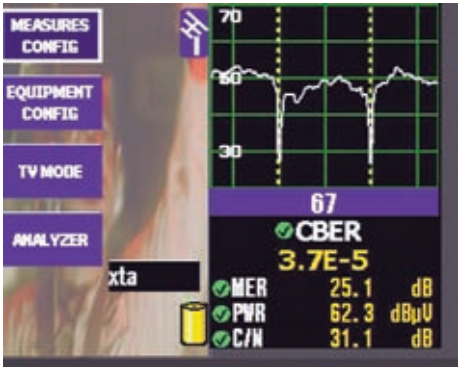
They maintain the optimal functioning temperature for the equipment.

3.- PRODUCT HANDLING

3.1.- THE MENU

As was said before, the different equipment functions are organized into a hierarchy of menus, making their browsing as easy and intuitive as possible.

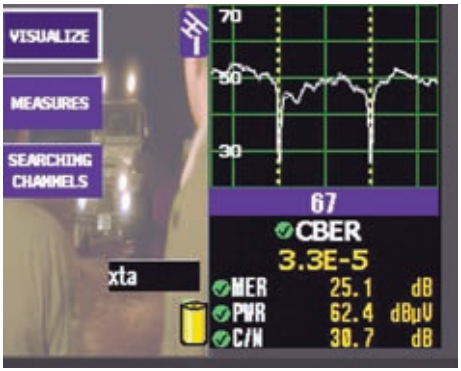
The menu texts appear on screen, over the background image, which may be the demodulated image of the TV channel tuned in (TV mode), the spectrum (analyzer mode), or a combination of both (combo mode). If we are viewing the spectrum or combo mode, the menu texts are invisible by default until you press button Clear Menu.



- Selection of options using cursors -

Inter-menu browsing is carried out by using the set of keys providing the menus are visible, or no option has been pressed. The viewing and hiding of the menus may be done using the key Clear Menu.

The following keys are used to browse the current menu: and . The selected menu function will be marked as shown in the image, deselecting the function which had previously been selected. The menu options with a black background and gray lettering may not be selected, since this indicates that they are not available in the version of the equipment that you possess. If you wish to enable them, please contact your distributor.



- Menu statuses -

To advance to the next level in the menu hierarchy (providing there is a next level) or execute the selected function, you may use the key

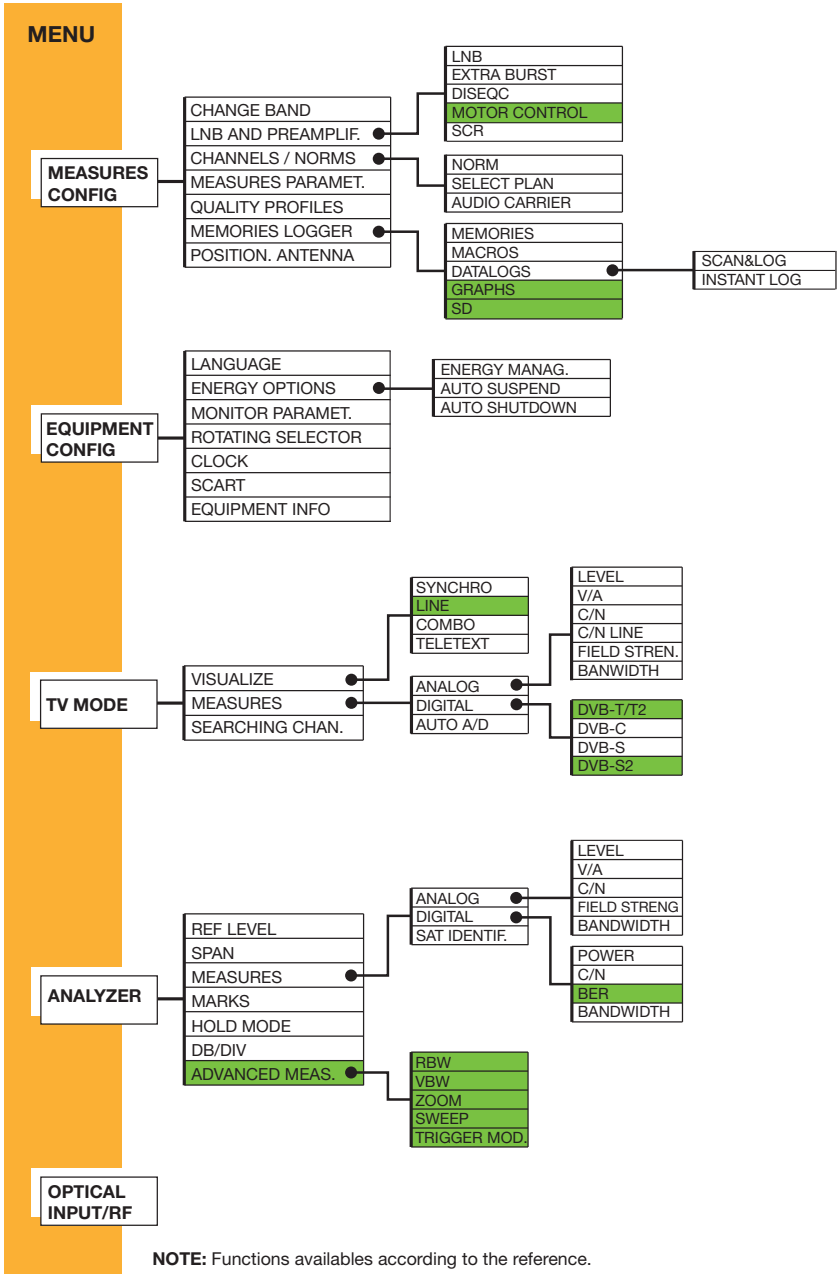
. In this case, if a higher level exists, the menu function will be selected. If it is the execution of a function, the menu button will appear pressed down.

To return to the previous hierarchical order of a menu (providing there is an immediately previous one), use key

.

If the equipment is in TV mode the measures will appear superimposed on the image, and may be hidden by pressing
. In the analyzer mode and in the combo mode, the measures are always visible, enabling the user in the analyzer mode to simultaneously see the measures he wishes to carry out and the spectrum of the signal. Besides, in the combo mode the user will see the measures, the spectrum of the current channel he is viewing and the demodulated image.

Shown below is a chart where the main functions of the equipment appear in hierarchical order:



NOTE: Functions availables according to the reference.

3.2.- TUNING MODES

The **H45** has two tuning modes: by channel, or by frequency. To select one or the other use keys

(channel tuning) and (frequency tuning).

If you are using channel tuning, the analog measures that are carried out will be made on the video carrier of that channel.

For example, if the plan selected is CCIR, and the channel tuned is S01, the video carrier frequency is 105.25 MHz. Then, when a level measurement is taken, the frequency level of the video carrier will be measured. For example, on measuring the C/N, the equipment will automatically seek the video carrier frequency and carry out the measuring action on that frequency. The same thing happens with the measurement of the V/A ratio.

On the contrary, if the frequency tuning mode is selected, the measurements will be taken on the frequency indicated.

If we take as an example the measurement of C/N, the carrier level will be measured on the user-selected frequency, that may not coincide with the frequency of the video carrier of any channel.

When there is a measurement window open, and the frequency tuning mode has been selected, if we press the key

, we will go to the channel tuning mode, and see the channel tuned on the window. The frequency shown is that of the video carrier of the channel that was tuned by analog mode, and the central frequency of the channel in the digital mode. By turning , we will automatically tune in to the next channel, and see the new measurements in the window. If we again press the key

, the channel information will disappear, and then we will be able to introduce the channel number manually, using the numerical keyboard so to confirm the channel we press

. In the event that various channels share the same channel number, a list showing the coinciding channels will unfold, in which the desired channel may be selected using the and pressing

.

When a measurement window is open and the channel tuning mode is selected, if we press the following key

we will go to the frequency tuning mode, and the frequency information text will show up clearly on a dark background, thus enabling us to vary the frequency by using the

(50 KHz variations). If we once again press the key

, the frequency information will disappear, and then we can introduce the frequency using the numerical keyboard and confirm the frequency by pressing

.

Within the satellite band, and in the frequency tuning mode, if we carry out prolonged depression of the key

we will alternate between Real Frequency and FI.

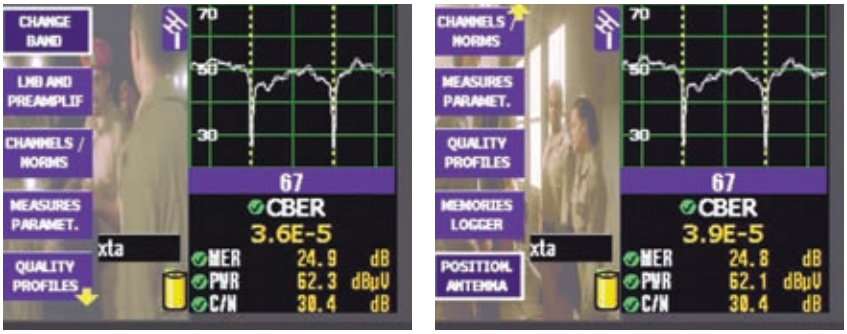
3.3.- FUNCTIONS

This section explains all the meter functions in detail. The main menu provides the following options:

3.3.1.- Configuration of Measurements

Using the functions of this block, the parameters affecting the measurements to be made can be established. All the windows that open for the different functions of the menu "Measurement Configuration" will close using the key Clear Menu. One may select different options in each menu by using the or the cursor keys when they are active. ***(The cursors will always be active when the menu is hidden or when a menu option has been pressed)***.

Within this option, we have the following sub-menu:



- Measures configuration -

3.3.1.1.- Band Change (terrestrial)

This enables choosing one of the following bands: ***terrestrial***, ***satellite and FM radio***. It may be noted that as the band changes, so does the icon appearing at the lower left corner of the screen.

If the terrestrial band is selected, the icon is a terrestrial signal receiving aerial. If the satellite

band is selected, the icon is a parabolic aerial. If the FM radio is selected, the symbol shown is a musical note.

- Band change -

A short pressure on the key 2, alternates between the terrestrial and satellite bands, while a long pressure on key 2 enables commuting between the terrestrial, satellite and FM radio bands.

3.3.1.2.- LNB and Preamplifiers

This menu accesses the LNB, ExtraBurst and DiSEqC configurations.

3.3.1.2.1.- LNB (quick key Load VDC 9)

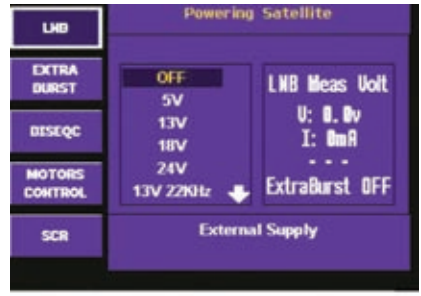
This accesses the menu for configuring the power supply to preampl. and LNB.

> ***When the meter is on, the option that appears selected will always be OFF.***

This option varies depending on whether the terrestrial or satellite band has been selected. In the terrestrial band when this function has been selected a window will automatically open by which the installer may select the voltage of the pre-amplifiers.

This window is shown below:

Terrestrial band



Satellite band

- Preamplifiers power -

The power for terrestrial band are: OFF, 5V, 13V, 18V and 24V.

If, contrarily, the satellite band has been selected, the installer can select the power and the tone of the LNB, and the following sub-menu will appear.

At the bottom of the previous window, the band (high or low) and the polarization (vertical or horizontal) corresponding to the power and tone selected are indicated:

OFF	
5V / 100mA	
13V / 400mA	low band – vertical polarization
18V / 300mA	low band – horizontal polarization
24V / 75mA	pre-amplifier power
13V 22KHz / 400mA	high band – vertical polarization
18V 22KHz / 300mA	high band – horizontal polarization
Auto	The channel table selected automatically inserts the suitable voltage and tone (***considering a universal LNB***) to select the (***high or low***) band and the (***vertical or horizontal***) polarization to tune in on the respective channel.

It should be noted that when a voltage is enabled to power an external device, the only red LED that the equipment possesses turns on Load. ***If this LED blinks, it is a sign of a problem***.

One should also bear in mind that voltage programming is associated with the band chosen for the equipment, so if one chooses 24V in terrestrial, this will not imply that the same voltage will be used for satellite.

The equipment continually monitors the voltage through the 'F' connector, and warns of any anomaly using a message window that is overprinted on any other open window.

The ***possible problems*** that may appear in relation to external unit power are the following:

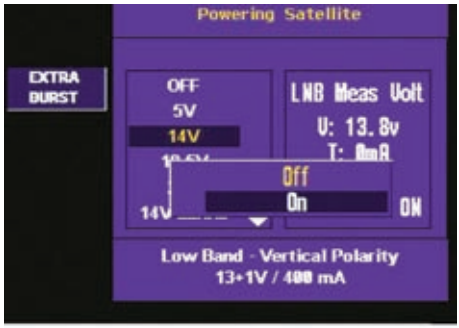
⇒ The equipment detects ***voltage in the coaxial cable***. In this case, the message that will appear is "Vext". This situation should be avoided.
⇒ When the equipment detects a ***short circuit***, it emits a sound signal, and the message appearing in this case is "Short Circuit".
⇒ When the ***power consumption exceeds the maximum value allowed***, the message appearing is "Límit Exceeded".

In the last two cases, the power is cut off, and automatic attempts at re-establishing it are made every 3 seconds, approximately.

3.3.1.2.2.- Extra Burst

The selection of this option provides a ***power voltage increase of 1V*** for a voltage of 13V (14V) and of ***1.5V*** for a voltage of 18V (19.5V).

The extra burst is applicable both for terrestrial and satellite.



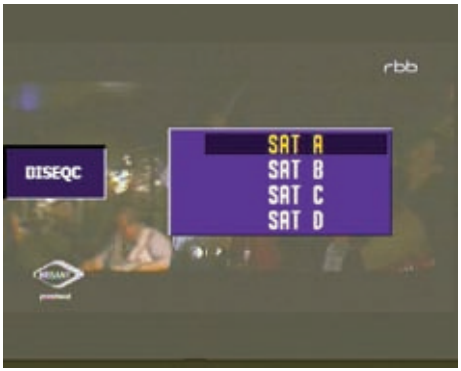
- Powering with Extra Burst -

3.3.1.2.3.- DiSEqC

The DiSEqC protocol enables working with up to 16 input multi-switches. For the purpose, and with the meter on the satellite band, on the power menu one should enable the voltage and tone corresponding to the required polarity and band of the satellite.

As well as the chosen polarity and band, the multi-switch should be provided with information on the satellite we intend to work with (the multi-switches group the different polarities in groups

of four, identifying each group of polarities as SAT A, SAT B .....). For the purpose, within the main menu "Measurement Configuration" and also within "LNB and pre-amplifiers" we will enter the DiSEqC section. The following window will appear:



- Satellite selection in the Multi-switch -

We will choose the right satellite (***An 8+1 input multi-switch will only offer satellites A and B***).

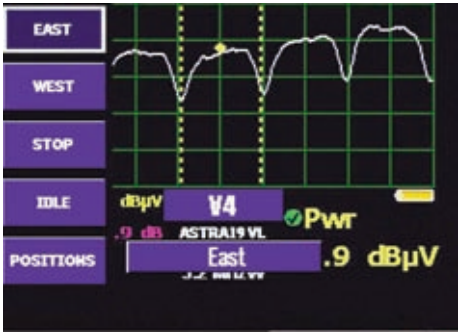
Once chosen, we will press OK. The equipment will proceed to send the command that informs the satellite multi-switch as well as the required band and polarity (previously selected in LoadVDC).

When one of the inputs of DiSEqC is selected, if the external unit power is on Off, an error message will appear.

3.3.1.2.4.- Motor Control Option

The **H45 Advance** makes it possible to control the DiSEqC motors used to move mobile parabolic antennas. ***This function is available in satellite mode and when the equipment is powering the LNB.***

If it is not in the satellite band, the message "Satellite Only" will be shown, and if there is no power the message "No DiSEqc. Vdc off" will be shown.



- Motor Control -

EAST: Allows the motor to move in the EAST direction. Each click corresponds to one step in the movement of the motor (pitch motors). By holding the key down, successive movement sequences will be executed until the key is released.

WEST: Motor movement in the WEST direction. Each click corresponds to one step in the movement of the motor (pitch motors). By holding the key down, successive movement sequences will be executed until the key is released.

STOP: This command stops the motor movement.

IDLE: Puts the motor in the reference position. This position will depend on the type of motor (normally 0º).

POSITIONS: 4 storage positions are available to store at up to 4 antenna positions.

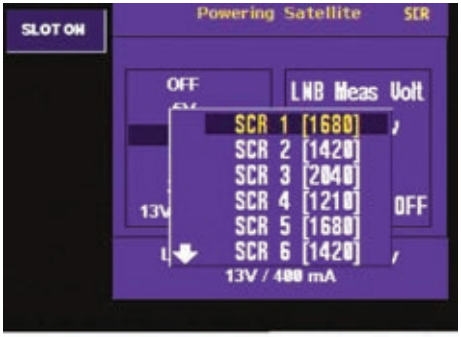
- **RECORD**: allows one of 4 positions to be chosen (A, B, C or D) where the current position of the antenna will be stored.
- **RECOVER**: recovers one of the four positions (A, B, C or D) for the antenna that has been previously stored.

3.3.1.2.5.- SCR

H45 allows one to control those satellite devices that use the SCR protocol, according to the EN 50494:2006

With the "SLOT ON"-button and whenever we are in SATELLITE-Mode and feeding LNB - otherwise the equipment will inform us with the appropriate error messages- "Only Satellite" "No Diseqc. Vdc OFF" respectively, we get a dropdown menu with the ability to select SCR channels from **SCR 1** to **SCR 8**. Moving the and pressing key we select the desired slot, being activated this SLOT SCR.

With the "SLOT OFF"-key and whenever we are in SATELLITE-Mode and feeding LNB - otherwise the equipment will inform us with the appropriate error messages- "Only Satellite" "No Diseqc. Vdc OFF" respectively, we get a dropdown menu with the ability to select SCR channels from **SCR 1** to **SCR 8**. Moving the and pressing key we select the SCR slot that we want to deactivate. Choosing from the SCR OFF list, all SCR slots will be deactivated, as well as the SCR.



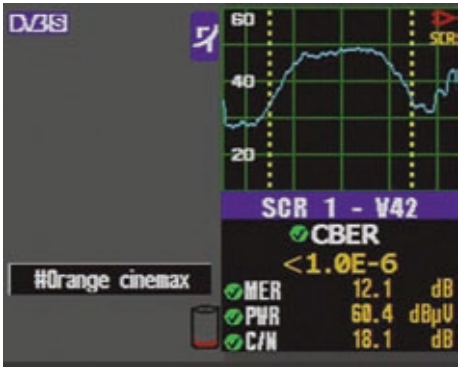
- SCR channel selection -

We can modify the frequencies of the SLOT using the "FREQUENCY SLOT"-key. Moving the and pressing key we select the slot from which we wish to change the frequency. We can choose the frequency by default, or another one. To select another frequency, we click on **Other**, and with or key we can change the slot frequency. (The frequency is entered in MHz).

The frequencies corresponding to each of these channels are defined by the standard 50494:2006

Channel	SCR0	SCR1	SCR2	SCR3	SCR4	SCR5	SCR6	SCR7
Frequency (MHz)	1680	1420	2040	1210	1680	1420	2040	1210

When this mode is activated, an indicator appears in the upper right corner with the flashing SCR indicator. In analyzer and combo mode, the traze colour of the spectrum becomes blue. Both the channel mode as the frequency mode we can see the SCR CHANNEL that is currently selected.



- The SCR mode indicator -

3.3.1.3.- Channels and Standards

3.3.1.3.1.- Standard

This enables the selection of the color standard. The available standards are the following: PAL B/G, PAL D/K, PAL I, SECAM B/G, SECAM L and SECAM D/K.

The following window is viewed on selecting this function:

- Standard selection -

3.3.1.3.2.- Selecting a Plan

This selects the channel plan that the user chooses. One plan can be selected for terrestrial and another for satellite.

The options we will have are the following:

Terrestrial band: CCIR, STDL, OIRT, CCIR-IT, FCC, DAB, SIM4009, SIM7637.

Satellite band: AMAZONAS, AMAZONASC, ASTRA19, ASTRA23, ASTRA28, ATL.BIRD3, ATL.BIRD3C, BARD26, EUROBIRD, EUTELSAT7, EUTELW2, EUTELW3A, HELLAS, HISPASAT, HOTBIRD, INTELSAT, INTELSATC, NILESAT, SIRIUS5, THOR1W, THOR1WC, TURKSAT, SIM4008.

Terrestrial band

Satellite band

- Channel plans -

On selecting a satellite plan, a list will unfold allowing the selection of the desired band and polarity (VL, HL, VH, HH and ALL). The option ALL includes all the channels of both bands, and both polarizations, ordered by frequency.

If LNB power is necessary, it is recommended to select the option Auto in the pre-amplifier and LNB power menu.

3.3.1.3.3.- Audio Carrier

The options appearing in this function will depend on the color standard that has been selected:

PAL B/G	5.50 y 5.74
PAL D/K	6.50 y 6.74
PAL I	6.00
SECAM B/G	5.50 y 5.74
SECAM L	6.50 y 5.85
SECAM D/K	6.50 y 5.85

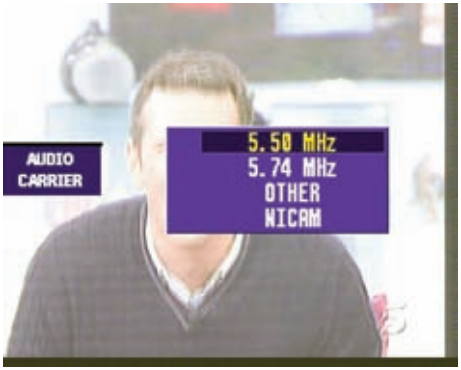
To select a user-desired option, you may use the .

As well as the sound carrier frequencies for each standard, the window offers two extra options: Nicam* and Other.

** Nicam only available on some option.*

If we select Nicam*, the NICAM* mode is enabled. This mode offers the ***BER NICAM measure***, as well as defining audio selection, for this purpose we must select the desired channel by using the and pressing OK.

If we select Other, the sound carrier selection window will close and a window will open in which the user can select another frequency comprised within "***4,00***" and "***9,00***" by using the .



- Audio carrier -

To close this window, use the key Clear Menu.

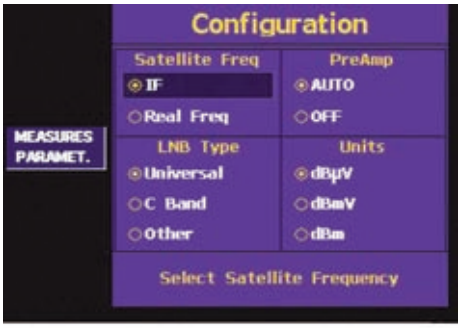
You may only select Audio Carrier in Terrestrial Analog mode.

** Nicam only available on some* **option.**

3.3.1.4.- Measure Parameters

This function enables the configuration of some of the equipment's parameters.

To browse options use keys and or . It is also possible to use the following keys or . To leave the parameter configuration press or .



- Measure parameters -

The different parameters to be configured are the following:

- Satellite Frequency

It determines the desired frequency, which may be Intermediate Frequency (IF) or Real Frequency.

- LNB Type

This option ***may only be modified if Real Frequency has previously been selected in the option Satellite Frequency***, enabling the choice of LNB type:

- Universal LNB: It is the right one for the Ku Band, oscillator frequencies will be 9.750 and 10.600 GHz, the real frequency range extends from 10,7 to 12,8 GHz.
- Band C: Oscillator frequency is located at 5,150 GHz, and on this band, the frequency range is 2,95 to 4,20 GHz.
- Other: This enables the choice of oscillator frequency, which may vary between 9 and 14 GHz.

- PreAmp

This enables the configuration of the input Amplifier stage of the equipment. At this stage we can choose if we want automatic starting or stopping of the equipment (AUTO) or whether it should be permanently stopped (OFF).

When the option is in AUTO and the meter considers it necessary to start up the stage, it will show that it is active with a blinking red icon.

- Combo mode with prior startup -

It is recommended to set the Amplifier stage at OFF when the total voltage at meter input is ***over 90 dBµV***.

- Units

The equipment offers the possibility of using several types of units: dBµV, dBmV and dBm . The meter is configured by default to measure in dBµV.

dBµV: This is used for devices with ***reduced output voltage***, under 130 dBµV, such as aerial devices.

dBmV: This is used for devices with ***reduced output voltage***, and particularly to provide receiver input sensitivity data and in CATV equipment.

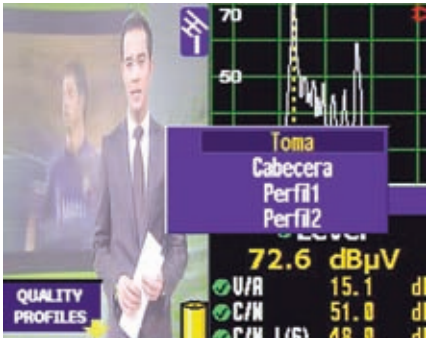
dBm: This is used in ***high-power*** devices such as transmitters and re-transmitters.

3.3.1.5.- Quality Profiles

Using this menu we can choose between the different profiles that establish the limits for the quality indicators. This means that users can choose a different profile depending on their requirements.

The device has 2 pre-installed profiles: ***socket*** and ***headend***.

Users may configure up to four profiles using the **HSuite** application.

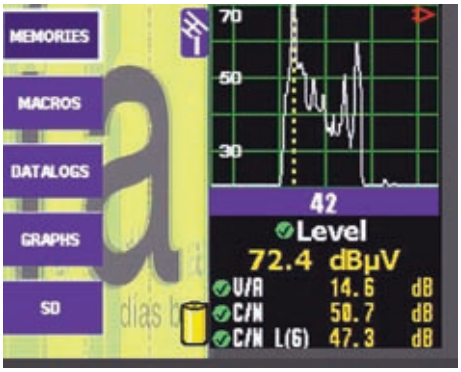


- Quality Profiles -

When recovering to the configuration by defect, all the changes realised in the profiles will be lost, returning to the profiles by defect of the measurer.

3.3.1.6.- LOGGER Memories

Within this section we can access a series of functions enabling the automation of most of the processes carried out with the meter.



- LOGGER Memories -

These functions are:

3.3.1.6.1.- Memories

One MEMORY enables the saving and recuperation of equipment configurations. The **H45** ***enables the saving of up to 250/1000 different configurations*** (memories) ***according to equipment version*** for your equipment, that you may easily recuperate. The meter is capable of storing any status, such as mode, standard, measure type, etc.

- List of available memories -

To configure the equipment according to the parameters stored in any given memory, you need only press quick key 5 (or browse through the menus up to function MEMORIES) and select the desired memory list and press button OK or press the menu button RECUPERATE.

In the event that no memory exists in the meter, the following message will be seen on screen "WITHOUT MEMORIES".

3.3.1.6.1.1.- Recuperation

This function recuperates the current selected memory.

3.3.1.6.1.2.- Recording

To save any given memory, ***locate the meter at the desired configuration, and press the quick key*** 5 ***. Select the*** MEMORIES ***function***, and the menu shown in the previous Figure will appear. Then ***press option*** RECORD. The memory list will be located at the end of the menu, and the name of the next free memory will appear blinking on and off.

The memory name appearing by default is always **MEM** followed by three digits in ascending numerical order on the list, but the user may give any desired name to the memory.

This gives us four possibilities:

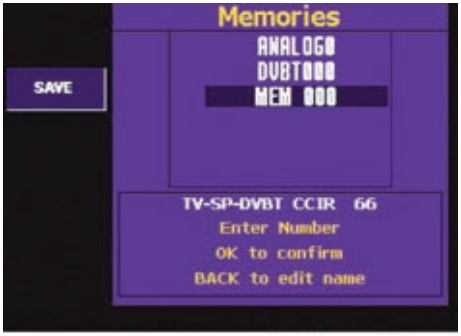
1.- Press OK to accept the name suggested by the equipment (by default).

2.- If what we want is to ***only change the numerical digits***, it will be enough to punch the corresponding keys on the keyboard.

3.- If we want to ***overwrite a memory*** on the list, we can use the to place us on it.

Once we are placed on the memory we want to overwrite, we can press key OK.

4.- If the memory name is to be changed, press the option EDIT NAME.



- Recording a memory -

Once the saving of a memory is confirmed, the following message will appear on screen "MEMORY RECORDED".

The maximum number of memories that can be stored by the meter is 250/1000, according to the equipment version. In the event the memory is completed, the screen will show the message "MEMORIES FULL".

The **H45** ***allows the Diseqc command to be stored in the satellite memories***. When we save a satellite memory ***with LNB power***, the equipment will give us the option of selecting among DiSEqC OFF and the 4 types of DiSEqC. (A,B,C,D). Using the we can make our choice and then press OK.

This function is particularly used when we want to measure installations with a great number of sockets, and with a SAT TV distribution system consisting of DiSEqC selectable multi-switches.

Each time a MEMORY is executed, the meter will automatically generate the corresponding DiSEqC commands and store the measurements, offering a significant time savings when measuring this kind of installation.

3.3.1.6.1.3.- Erase

When you wish to erase a given memory, press option ERASE. A new window will appear displaying a list of the available memories.

- Erase memories -

Using browse through the list. When you find one of the memories to be erased, press OK, and this memory will be highlighted.

If you wish to select all the memories of the meter, you can use the option SELECT ALL, and all the memories will be highlighted.

Once you have finished selecting, press the option CONFIRM to erase the memories you have selected.

On confirming memory erasure, the following message will appear on screen "MEMORY ERASED".

3.3.1.6.1.4.- Editing memory name

With this function the user can modify the name of any memory, whether it is already saved or it is a new one he/she wishes to save.

- Editing memory name -

If it is a memory that is already on the list, press the option EDIT NAME and then, using the , select from the list the memory whose name you wish to change. Press OK to accept. The first character of the name will blink, indicating that it is the one being edited. by turning the , or using the cursors the other characters of the alphabet, including numbers 0 through 9 will appear. The character "_" indicates a blank space, meaning that once the name has been saved, this space will remain blank. When the desired character appears in the desired position, simply press the button OK or Enter and the process will start anew with the next character in the name. If you wish to return to the previous character, press the key Back on the keyboard.

The ***name of each memory must posses between 1 and 7 characters***. Name editing ends once the 7 characters of the name have been edited. If the intended name has fewer than 7 characters, the remaining spaces must be completed with character "_".

If you wish to rename an existing memory, and if the new name has fewer characters than the old one, you must substitute the characters you wish to erase with "_" (i.e., blank spaces).

If you attempt to apply an existing name on the memory list to a new memory, the equipment will beep. You confirm by pressing OK (in which case the old memory will be erased) or cancel

the action by merely turning , which will annul the new name and restart the process.

A name composed entirely of blank spaces is not accepted either. In this case the meter will display an “incorrect name” message.

On confirming the memory name change, the following message will appear on screen "MEMORY EDITED".

3.3.1.6.2.- Macromeasures

A Macromeasure is a set of memories that the meter will execute automatically.

When we execute a Macromeasure, the meter recovers each of the associated memories, and records the measurements in a LOG.

Up to ***100 different Macromeasures*** of up to 250 memories each can be configured.

The meter is capable of measuring from a list of memories every time this is necessary, and the results may be shown on the display of the meter itself or downloaded to the computer.

A DATALOG is a listing of the results (measurements) obtained on automatically executing a Macromeasure once or twice.

The meter enables the storage of multiple different Logs. Each LOG can in turn store a great number of measuring acts. Each of these can in turn store a large number of measurements.

To execute a Macromeasure, we press the quick key to take us to the Macromeasure function.

The window will show the list of Macromeasures that we have on the meter. The meter will report by message when there is no Macromeasure stored.

- Macromeasures -

If we have Macromeasures on the meter, we will use the to browse through the list, and then press "**Execute**" or key OK.

3.3.1.6.2.1.- Executing Macromeasures

This function is used to enable the Macromeasure to run through all the associated memories and record the results on a LOG.

- Executing a Macromeasure -

You can execute a Macromeasure as many times as needed.

Before starting the process of measurement recording, the meter shows a configuration window on the execution of the Macromeasure.

- Macromeasure Options -

The Parameters to be configured:

- **Outlet**: There are three options. The equipment establishes an order for the execution of the Macromeasure, stopping at the chosen option.
  - *Wide band*: The Macromeasure executes all its associated memories.
  - *Ter/Sat*: The Macromeasure first executes the terrestrial memory and then the satellite memory.
  - *FM/Ter/Sat*: The Macromeasure first executes the FM memory, then the terrestrial one, and finally the satellite memory.
- **Log Options**: This option enables the selection of a previously created LOG or starting a new one.
  - *New Log*: Each time the Macromeasure is executed, the meter will create a new Log to store the results (the measurements).
  - *Summary Log*: The meter will store the results of the Macromeasure in the desired Log.
- **Edit Log Name**: With this function, the user can change the name of the new LOG.

For the meter to start recording the measurements of Macromeasure execution, you should press key OK on the option "**Execute Macromeasure**".

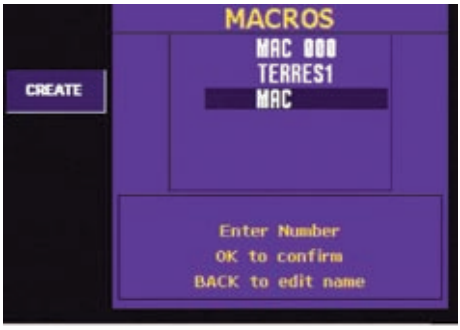
- Executing a Macromeasure -

3.3.1.6.2.2.- Creating Macromeasures

This function is used to create new Macromeasures from the meter memories.

The meter can store up to 100 lists (Macromeasures) of different memories, which can include up to 250 memories each.

When we press function "**Create**" the meter proposes a new name for the Macromeasure. Later we can change it by using the function "**Edit Name**" described below.



- Creating a Macromeasure -

On pressing key OK a list appears with all the memories stored in the meter. Using the we can browse through the different memories.

To associate a Memory to a Macromeasure, we can press key OK. The Memory we mark will be shown in yellow. To record the configuration, we press the function “**Confirm**".

The meter enables the recording of non-measurement conditions. It is therefore possible that on creating a Macromeasure some of the Memories may not be used.

3.3.1.6.2.3.- Erasing Macromeasures

Using this function, we can erase the Macromeasure that we mark.

The erasure of a Macromeasure does not affect the DataLogs. If a Macromeasure is erased, this will not erase the DataLogs.

3.3.1.6.2.4.- Editing a Name

This function enables the changing of the name of a Macromeasure. To change the name, we browse through the list of Macromeasures, using the and press key OK. To change each position, we will use the and we can use keys OK or Back to browse through the text.

3.3.1.6.2.5.- Macro Editing

The "**Macro Editing**" function enables one to change the Memories associated with a Macromeasure. We may therefore include new Memories, or remove Memories from the Macromeasure.

3.3.1.6.3.- DATALOGS

In this section you can ***see the results of the*** Macromeasures ***executed and the results of the*** SCAN&LOG. The meter will show a window with a list of DATALOGS. At the bottom of the window, the contents of each will be shown.

- DATALOGS -

The DATALOGS ***are the measures that the meter has saved*** when carrying out one of the following functions: Macromeasure or SCAN&LOG. The measures of a Macromeasure are identifiable as being composed of two parts: the first identifies the saved LOG name, and the second column indicates the name of the macromeasure.

In the event there is no DATALOG stored in the meter's memory, the message "WITHOUT DATALOGS" will appear.

- DATALOGS -

By using the we can move through the list of DATALOGS. Once we have selected our DATALOG of interest, by pressing the button we can access the results it has stored. The data are displayed on a two-column table that shows on the left the sockets measured, and on the right the results for each socket. By turning we will browse through the different sockets of the DATALOG (left col.), and pressing we will change column (left to right and right to left). Using the we will be able to move through the column we have selected. Pressing the key we will return to the list of DATALOGS.

3.3.1.6.3.1.- Erasing DATALOGS

With this option we will eliminate the DATALOGS we have selected. For the purpose, on we will find DATALOGS, selecting and deselecting them with button . The save marked will be shown in yellow, and then we will press the option CONFIRM ending the erasure operation by once again pressing the button the message "DATALOG ERASED" appearing on screen.

When a memory is erased or edited, one is also erasing or editing the Macromeasures in which that memory has been included.
The fact of erasing or editing a Macromeasures does not affect the DATALOGS that have been generated with the erased or edited macromeasure.

3.3.1.6.3.2.- Editing DATALOGS

From this option we can change the name of the desired DATALOG at any moment. For the purpose, by using the we can select the DATALOG to be edited, confirming with the button. The character selected will blink. Using or the cursors we can change the selected character. To accept the change, we can press button . Using the cursors

we can move through the list of characters.

3.3.1.6.3.3.- SCAN&LOG

The serial SCAN&LOG function that is incorporated in the meter automates the equipment to scan the terrestrial and satellite bands and carry out measurements as a function of selectable parameters.

- SCAN&LOG -

This function enables the automatic identification of the analog or digital nature of a channel, in the satellite band if we are analysing a DVB-S2 (Option) or DVB-S channel and carryout the necessary measures for each one. These measurements are stored as a DATALOG.

In the SCAN&LOG mode, we use the to browse through different available options, and press the button if we wish to enable the option chosen.

In the diagram one can see three different columnss.

The first one on the left, with the heading Socket has two verification boxes that indicate the type of socket we have: The one indicating Ter/Sat is really for those installations where the satellite and terrestrial signal are on different sockets, therefore, when the terrestrial bandwidth analysis has finalised, a message will appear indicating the socket must be changed in order to continue with the satellite bandwidth analysis. The one indicating Broad Band carries out a full analysis of both bandwidths without having to change sockets.

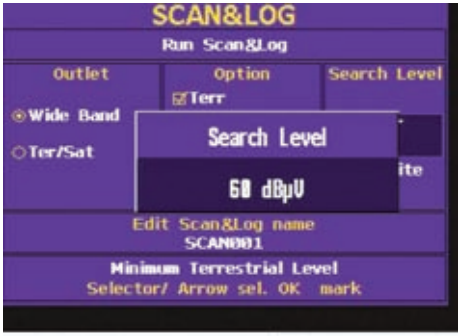
In the Option column we can select the type of measurement we want the meter to take. The options are the following:

- Terrestrial
- Terrestrial and DVB-S
- Terrestrial, DVB-S and DVB-S2 (Option)
- DVB-S
- DVB-S2 (Option)

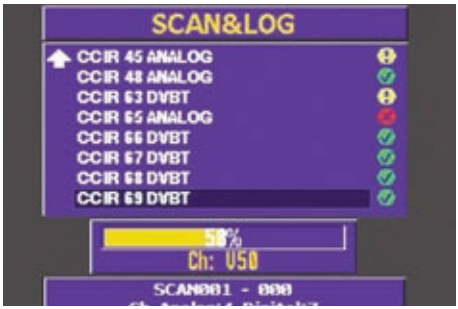
When a Terrestrial scan is taking place the BER DVB-T option can be on. In this case as well as the Power and C/N parameters it also measures the ***CBER, VBER and MER parameters.***

Turning off the BER DVB-T option enables a faster analysis of the terrestrial bandwidth.

The column on the left allows one to select the ***search range*** at which the SCAN&LOG will start to measure the different channels. To change this range we must press OK over the search range (TERRESTRIAL and SATELLITE) and with the we can enter a value between **40** and **120** dBµv or the **OFF** value to deactivate the function. There is a separate search range for terrestrial bandwidth and satellite. This range is also used in the manual search function, using the 6 key.



- Search Range -



- Progress of a SCAN&LOG -

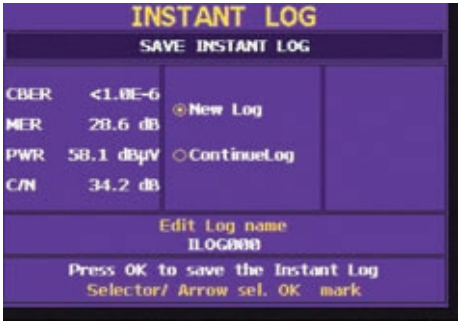
To cancel the search, we press the key Clear Menu and a message of confirmation will appear. When we press button OK the SCAN&LOG ends, and pressing any other button will restart it.

Once the SCAN&LOG is over, we will be shown a listing of the channels found and the measurements on those channels. Using the we can browse through them, seeing the measurement parameters. If we are interested in tuning in a channel on the list, all we need do is select with and press button OK.

3.3.1.6.3.4.- INSTANT LOG

Thanks to the Instant Log function the meter can record the measurements that are currently being seen in DATALOG format.

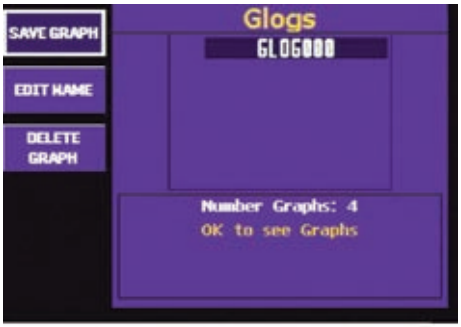
Direct access to this function can be gained on TV mode by pressing the Save 8 key directly.



- Record of an InstantLog -

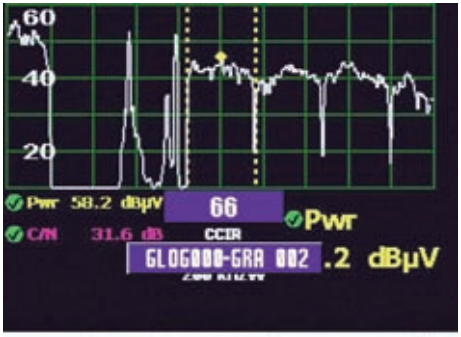
3.3.1.6.4.- Graphs Option

The “graphs” function allows one to save a graphs onto the memory. This graphic may be a spectrum in any of its configurations or a representation of the DVB-T ECHOES diagram. These graphs can be seen on the meter or transferred to the SD card (only some options) or downloaded via **HSuite** for subsequent use (transferring onto Excel®, printing, etc…).



- Stored GLOGs -

The graphs that have been stored on the meter will appear on screen when pressing the Graphs key and using the Save Graphic function (see paragraph 3.3.1.6.4.1).



- A GLOG graphic -

The graphs are organised within the meter as directories or so-called GLOGS. To view a GLOG in particular one must first select it using the to move around and once on the

one we wish to view press the OK or Enter key. Once we have pressed the relevant key all the graphs in that directory will appear. We can select each one by using the and the OK key. Pressing the Back key at any point will take us back to the main GLOGS menu.

At that point the saved graphic will appear on screen with its name flickering. If we wish to continue viewing all the graphs stored in that very directory, we can do so using the or the ▲/▼ cursors. To exit this mode, press the OK or Enter key to return to the list of graphs or the Clear Menu key to go back to the previous mode.

If when selecting the function no graphs is available, the meter will indicate "NO GRAPHS"

3.3.1.6.4.1.- Save Graphs

This function enables one to store the traces seen on screen. For this and always when on **spectrum** or **ECHOES** (DVB-T) **mode**, simply press the Save 8 (key (browsing through the menus until one gets to the Save Graphs mode is also an option).

The meter will indicate when we are on the wrong mode with the message "INCORRECT MODE".

The **maximum number of graphs** which can be stored is **250**.

The graphic is saved onto the same GLOG as the previous graphic by default and the meter automatically allocates a GRA --- name, where the dashes are consecutive numbers. This number can be modified by directly inputting the numbers with the keyboard. If one wishes to modify the full name of the graphic as well as the three digits, press the Back key, the first character of the file name will start to flicker and one can change each of the 8 characters.

By pressing the ***GLOG OPTIONS*** these parameters can be changed as indicated in paragraph *3.3.1.6.4.1.1 GLOG Options*.

3.3.1.6.4.1.1.- GLOG Options

With this function one can modify the default parameters set by the meter when saving graphs. Scroll through the list of options with the or the cursors and select as required. The options available are:

New GLOG: Allows one to create a new GLOG in which to store the graphic.

Continue GLOG: This option lists all the available GLOGs. With the or the cursors, position the key over the GLOG required and press the or key to select the GLOG to which the graphic will be added.

Rename the GLOG: This option allows one to change the GLOG name in which the graphs are stored. To do so, select the character with the cursors and with the begin to change them, to confirm a character change press . Once the seven characters have been modified the graphic will start saving onto that GLOG.

3.3.1.6.4.2.- Edit File Name

This function allows one to edit the GLOG name. To do so, select the GLOG required using the cursors or the and pressing the key. At this point the first name character will start to flicker, using the select the desired character and confirm it by pressing the key. To move onto the next character use the . Once the eight characters have been modified the message "EDITED GRAPHIC" will appear on screen.

3.3.1.6.4.2.1.- Edit Graphic File Name

To edit a graphic file name, one must previously select it using the and confirm with the key. Once it has been selected, follow the process as previously indicated.

3.3.1.6.4.3.- Delete Graphic

This function displays the full GLOGS listing. A specific GLOG may be selected using the cursors and the OK key. The selected GLOG will appear in yellow. At the bottom, the selected GLOG numbers will appear. Pressing OK over the selected GLOG will deselect it.

Rather than selecting the GLOGS one by one, one can use the ***Select ALL*** function.

Once the GLOGS have been selected, press the ***Accept***. key to delete. A message on the bottom will advise that pressing OK will delete the GLOGS. In that case the meter will show "Graphic deleted".

Using the ***Select Graphs*** function allows one to delete the Graphs within a GLOG. The process is similar to that used for deleting GLOGS.

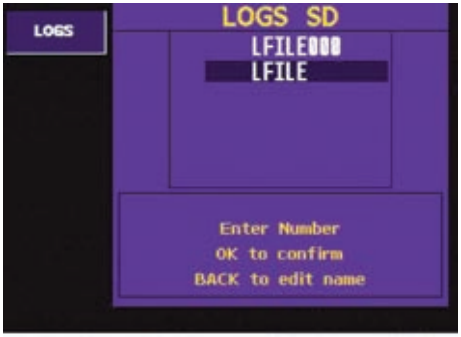
3.3.1.6.5.- SD Option

With this function one can transfer both data logs and graphs to the SD card which comes with the unit as part of the series.

3.3.1.6.5.1.- Dump

This function enables us to choose whether we want to transfer LOGS or GRAPHS to the SD card.

Once the LOGS or Graphs button has been pressed the relevant list of all those stored on the meter will appear.



- Files stored on the meter -

The name of the folder stored on the SD card is by default always **LFILE** or **GFILE** followed by 3 digits listed in ascending order, but the user may give the folder whatever name he or she chooses. To change this name, there are four possible options:

1.- Press OK to accept the name which the unit has given us by default.

2.- If all you want to do is change the numbers, you can do so by simply typing them into the keyboard.

3.- To overwrite a folder which has been transferred from the list, use the to place the icon over the transferred folder you wish to overwrite and press OK.

4.- To change the name of the transferred folder, press the *EDIT NAME* key.

Once the log folder transfer is complete the message "GRAPHS DUMPED" or "LOGS DUMPED" will appear on screen. The maximum number of folders which the SD card can store depends solely on its capacity. In the event of the SD card being full the message "LOGS DUMPED ERROR" or "GRAPHS DUMPED ERROR" will appear on screen.

If there is no SD card available the message "INSERT SD CARD" will appear.

3.3.1.6.5.2.- Deleting

To delete a folder from the SD card, press the ***DELETE*** key. Once LOGS or GRAPHS have been selected a new window will appear where the LFILES or GFILES respectively can be seen.

- Delete LOGS or Graphs -

Scroll through the list using the . Once you have found some of the log transfers you wish to delete press OK, to highlight that file. If you wish to select all the SD card files, you can use the *SELECT ALL* option. Once you have finished selecting, press the ***CONFIRM*** option, press the OK key to reconfirmation the request. Once the log transfer draft has been confirmed the message "SD LOGS DELETED" or "GRAPHS DELETED" will appear on screen.

3.3.1.6.5.3.- Info

To get information about the SD Card, its capacity, disk space used and available space, press the ***INFO*** key. A new window will appear with all the relevant information.

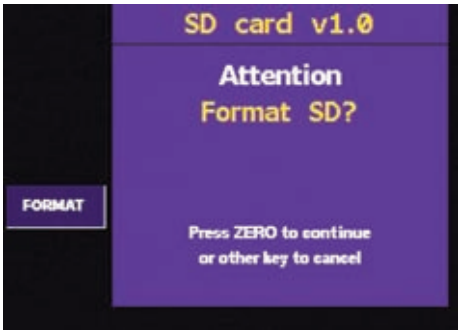
- Info -

3.3.1.6.5.4.- Formatting

To format the SD card, press the ***FORMAT*** key. Bear in mind that when formatting, all data stored on the SD card will be lost.

Confirming the function to be carried out, is done so by pressing the

key. Once formatting is complete the message "FORMAT COMPLETE" appears on screen.



- Format card -

3.3.1.7.- Positioning antennas

When this menu button is selected, it gives you the option of enabling (ON) or disabling (OFF) the aerial directing function.

This function has been designed to give the installer a reference in regard to signal reception quality, at the moment of directing an aerial, without his needing to view the data shown on the equipment screen.

It is an acoustic signal, in the nature of an intermittent beep, whose intermittency and tone frequency depend on the quality of the signal on the channel that has been tuned.

The signal reception parameters that this function measures to generate the sound signal depend on the operating mode of the equipment: if digital measurements are being made, the parameters taken into account are power and C/N; if analog measurements are being made, the parameters evaluated are level and C/N.

The sound signal variation is as follows:

The tone frequency (high or low-pitched tone) ***will be greater (high-pitched tone) the greater the level in the case of analog measurements or the greater the power in the case of digital measurements***. Conversely, the tone frequency will be lower (low-pitched tone), the lower the level or power, in the case of analog or digital measures, respectively.

If the field meter is in the spectrum analysis mode, the function takes as its reference the reference level that has been selected. This means that the tone will be more high-pitched the closer to reference values in level or power, in the case of analog or digital measures, respectively.

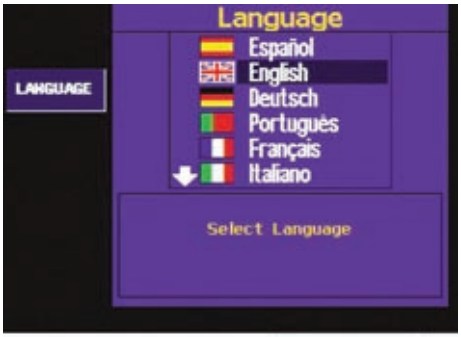
The intermittency speed will increase as a function of the C/N of the signal received. The beeps will be faster (less time between beeps), the higher the C/N. Conversely, the beeps will be slower (more time between beeps) the lower the C/N of the signal received.

3.3.2.- Equipment Configuration

This option enables access to equipment configuration functions.

3.3.2.1.- Language

The **H45** gives you the ability to select menu language. The languages available are: ***Spanish, English, Portuguese, French, German, Italian, Polish and Russian***. The following window opens when you select this menu.



- Selection of available menu languages -

3.3.2.2.- Energy Options

In this menu one has various functions for managing the **H45** meter´s energy.

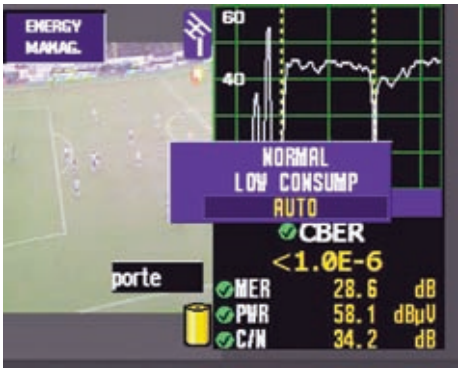
3.3.2.2.1.- Energy Management

With this function one can select from three different unit operating modes. The three possible modes are:

Normal: The meter´s standard operating mode.

Energy-saver: In this mode and using the information offered by the light sensor, the brightness of the screen backlight is reduced and various electronic parameters are adjusted, which increase battery life.

AUTO: If the meter is not connected to an external power supply, it operates in a similar way to the energy saver mode. When the unit is connected, it operates in the same way as the NORMAL mode.



- Energy management -

3.3.2.2.2.- Automatic Sleep Mode

The unit has a ***sleep*** option which can be programmed to activate once the idle time has lapsed. The idle time can be programmed from 1 to 59 minutes. The user may also deactivate this function (OFF). The default idle time is set at 10 minutes.

Once the idle time has lapsed the meter will enter sleep mode. The screen will turn off and the flickering LED lights will indicate this status. Pressing any key on the meter will make it return to normal mode in less than 1 sec.

3.3.2.2.3.- Automatic disconnecting

The equipment offers the option of ***automatic disconnecting*** *after a programmable period of inactivity. This period can be of between 1 and 59 minutes. The user can also disable this function (OFF). The equipment default value is 15 minutes*.

- Disconnecting time -

When the user-programmed disconnecting time has gone by with the equipment inactive, a message will appear on screen reading Automat. Disconnect. along with a progress bar and a sound signal indicating that the equipment is about to turn off.

When the progress bar achieves 100%, the equipment will turn off. The user may ***cancel the equipment turning off process by punching any key***, which will reactivate the programmed inactivity cutoff period.

Once the user-programmed disconnecting time has gone by, if a Macromeasure is being executed, the meter will wait until the end of the measure to proceed with automatic disconnection.

3.3.2.3.- Monitor parameters

This groups the ***functions controlling monitor parameters: volume, brightness, contrast, color and high visibility***.

The window appearing when enabling these functions is similar in every case. It is a horizontal bar whose length varies with the level of the selected parameter. To vary the value of these parameters you may use the . To accept the selected value, you may use the button and to cancel the selection and close windows, you may use key .

3.3.2.3.1.- Volume. Quick key

Using you may raise or lower the volume. The screen looks like this:

- Volume -

With button OK the adjustment window is closed. By once again pressing key the parameter changes.

3.3.2.3.2.- Brightness. Quick Key

This increases or reduces the brightness of the image on screen. It works in a similar way to the volume control.

3.3.2.3.3.- Contrast. Quick Key

This increases or reduces the contrast of the image on screen. It works in a similar way to the volume control.

3.3.2.3.4.- Color. Quick Key

This increases or reduces the color intensity of the image on screen. It works in a similar way to the volume control.

3.3.2.3.5.- High visivility. Quick Key

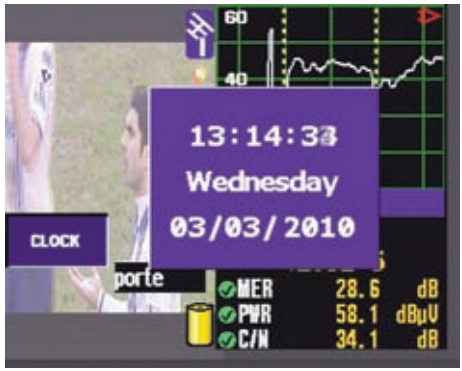
This function configures the meter to improve viewing of the display in strongly illuminated environments.

3.3.2.4.- Rotating selector

This function allows users to adjust the sensitivity of the rotating selector on the device.

3.3.2.5.- Clock

The following window opens:



- Clock option -

This sets time (hour and minutes) and date (day of the month, month and year). The user need only press key and current hour lights up (dark blue background frame). By turning the , time changes. Pressing the new hour is set and the process is repeated for minutes. Pressing a third time, you select the day of the month, and lastly you select the year. The day of the week varies automatically according to the day of the month and the year.

To close the clock window, use the key .

3.3.2.6.- Scart

This enables you to select the SCART signals control:

- Scart Options -

Two columns are shown, that on the left configures ***Scart as input*** and that on the right configures ***Scart as output.***

To switch from one column to another, we can use the keys Back Enter. With the cursors , , or the we will be able to move within the different options in a column, and using the button OK we can confirm the chosen option.

To close the window, we press Clear Menu or press OK twice.

The different options are listed below:

Scart as input *(left column)*:

On: ***This forces the input of the SCART signal***. In this case, the Scart icon will always appear instead of the aerials, whether or not there is a signal in the SCART.

Off: ***Disables the SCART***.

Scart as output (right column):

TV (Video(: The video signal visible on the meter is sent to the Scart, to be viewable in another device that has SCART input. ***The OSDs visible on the meter will not be sent to the Scart***.

TV + OSD (RGB): The output signal of the SCART is the ***combination of the video signal visible on the meter and the OSDs that are visible on the meter***. The output signal will be as shown on the meter screen in RGB format.

It is important to check the status of Scart mode selection, since if the Scart On option is selected we will not be able to see the TV signal on screen when we want to use the equipment in normal mode (RF connector input signal).

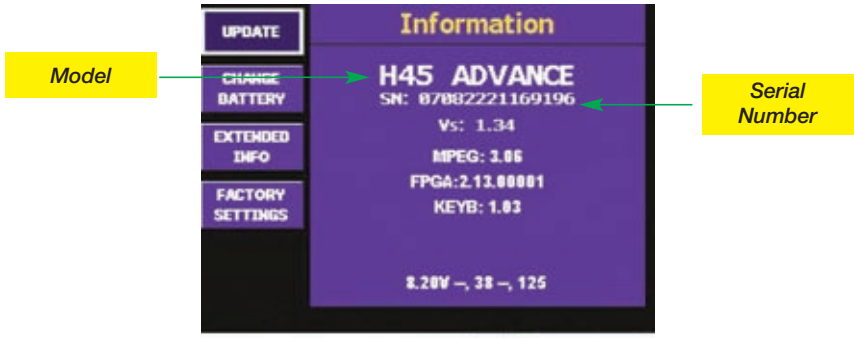
⇒ In the event **there is a signal in the SCART**, and it is being displayed on the screen (**input mode ON**), the meter will continue functioning normally in regard to measurements. This means that the measurements that will be made are those corresponding to the input signal of the “F” connector. No measurements can be made with the SCART signal. The same thing happens in regard to the spectrum depiction of the signal, i.e., although the image displayed on the screen is from the SCART, the spectrum will be that corresponding to the RF input signal. The only exception to the above is the display of the synchronism impulse and of the line, whether it is from the SCART or the "F" connector.

⇒ It is convenient to remember that if you wish to view any TV signal, you can take the menus off the screen by using key

and remove measuring windows by using
.

3.3.2.7.- Equipment information

When you select this function, a window will open showing equipment information, as shown below:



- Equipment Information Window -

3.3.2.7.1.- Updating

Using this option we can upload the license number, enabling an option package.

3.3.2.7.2.- Battery replacement

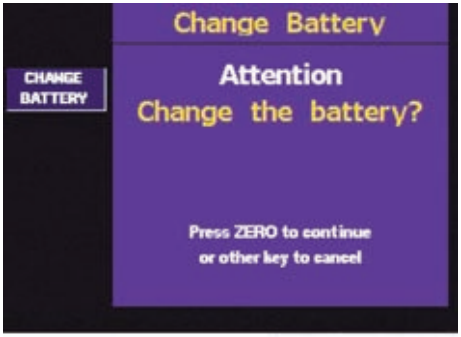
When the installer wishes to change batteries, it will be necessary to inform the equipment of the change so that it can adapt the charging and discharging algorithm of the battery to optimize its autonomy and lifespan.

The following are the steps which must be followed when replacing batteries:

1.- ***Replace the battery*** following the instructions in section *5.1. Battery replacement.*

2.- Select the function Battery change. A confirmation request for the change will then be displayed on the screen. To confirm the change, you must press the key

, if any other key is pressed instead of this one, the change will be cancelled.



- Battery change information window -

This function must be used only and exclusively when a battery replacement has been made, since it affects a series of parameters that are necessary for controlling battery charging and discharging and if these vary, there will be a negative effect on the autonomy and lifespan of the battery.

3.- Turn off the equipment.

4.- Disconnect the equipment from the power grid.

Precautions to be taken when replacing battery:

- Both when removing the battery from the equipment and when reconnecting it, make sure that the meter is turned off.
- If the battery is removed from the equipment, when it is replaced, make sure that it is properly reconnected.
- If metal tools are used for battery installation, the battery must be insulated, because a short circuit might occur.
- Do not connect the positive and negative poles of a battery with any metal item, since it could heat up, emit hydrogen gas, overflow, burn or explode.
- Only batteries supplied by Televés and adapted to your equipment may be used.

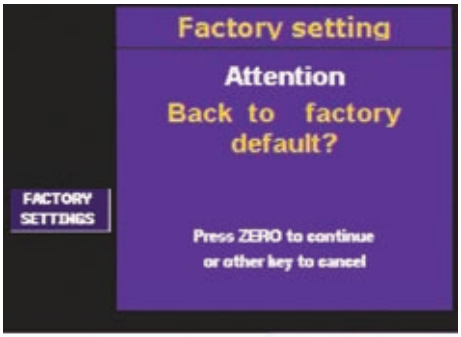
3.3.2.7.3.- Extended information

This screen shows information that should be supplied to the technical service whenever technical assistance is needed.

3.3.2.7.4.- Factory configuration

This returns the equipment to the ex-factory configuration.

All changes carried out in the equipment will be lost, except Memories, Macros, LOGs and Graphs.



- Factory configuration -

To confirm the change, you must press the key

, if any other key is pressed instead, the change will be cancelled.

3.3.3.- Television Mode

When this menu is selected, the mode changes automatically to TV.

If the meter is in analog mode, the demodulated TV signal of the tuned channel will be displayed on screen if we are in the terrestrial mode. The analog signals of the satellite band will not be demodulated.

If the meter is in digital mode, the digital measurement screen will be displayed. We can view the TV signal of a digital channel by pressing the key , or the MPEG option on the menu.

The sub-menu corresponding to this block is the following:

3.3.3.1.- Viewing Mode

By using the functions of this sub-menu we can select the items we wish to be displayed on the meter screen: synchronism impulse, television line(1), combo (television-spectrum) and teletext.

3.3.3.1.1.- Synchronism

In this case, what is viewed is the ***representation of the synchronism impulse*** on the right side of the screen.

> If you are carrying out a digital measurement (***power, C/N, BER, MPEG, Constellation, ECHOES***(1)), it will not be possible to view the synchronism impulse, since the meter is informed that the channel tuned in is a digital or satellite one, and therefore does not require the representation of the synchronism impulse.

To stop viewing the synchronism impulse, simply press the option once again.

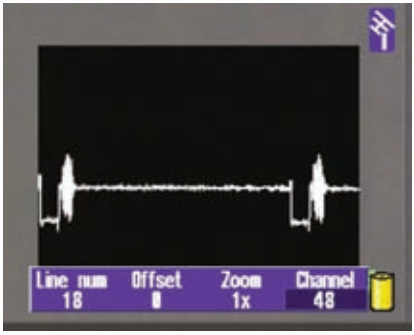
(1) Available options depending on the model

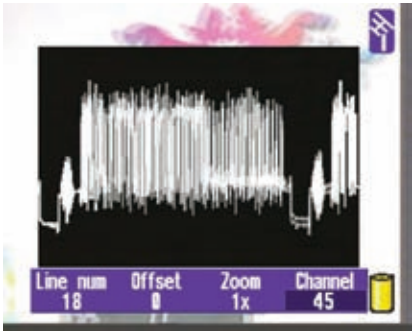
- Syncronism -

3.3.3.1.2.- Television Line Option

In this case you will view a certain television line. On the lower section of the screen the parameters that may be changed for line viewing will appear. To move through these parameters we can use the cursors

.





- TV Line -

Parameter description is as follows:

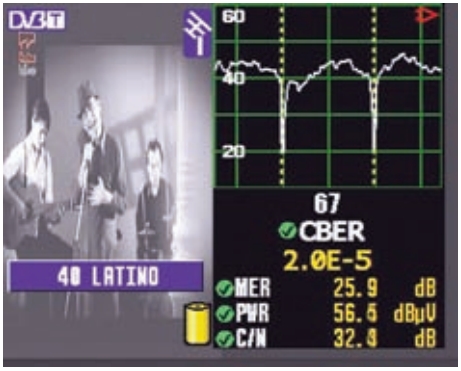
Line Number	This is where we show the line we wish to view. This value must be between ***1 and 625 for standard PAL and between 1 and 525 for standard NTSC***. To change this value, we can use the or press key to introduce the value directly and to validate.
Zoom	In this option we choose the zoom we wish to apply on the line, choosing from among ***1x, 2x, 4x and 8x***. To change the option we can use the
Offset	This option may be used to browse the line in the event we have a ***zoom value that is different from 1x***. To change the option we can use the
Channel	This indicates the channel we are viewing. If we press the key the channel name will be shown, and if we press the channel frequency will be shown. To change channels, we can press or , according to whether we are viewing the channel name or frequency, and insert the new channel, confirming this with . We can also use the to change the value.

To stop viewing the line, this option must be pressed again, or you must enter a mode that is different from terrestrial Analog.

3.3.3.1.3.- Combo (Television - Spectrum)

Using this mode, ***we can view the television image, the spectrum and the measures on any given channel at the same time***.

The meter screen is divided into two sides: on the left side we can see the TV image, and on the right we can see the spectrum and measures on the channel.



- Combo mode -

We can commute between analog and digital channel by pressing key . For the analog channels, the measures shown are: ***the level, V/A*** (terrestrial only) ***and C/N***. For the digital channels, the measures shown are: ***CBER, MER, C/N, channel power and C/N Line.*** (In the case of DVB-S2, CBER is replaced by Linkmargin).

We can commute between terrestrial and satellite channel pressing .

In the event it is a digital channel and the equipment has obtained services, we can change service (if the menus are hidden) by using the cursor keys or , or by pressing , in which case we will be shown a list of the services offered by this channel. To browse this list we can use the , pressing button to choose a given service.

The key 3 is a quick key that we ***can use to browse through the different modes*** in a circular way (TV ⟹ Analyzer ⟹ Combo), and if we maintain pressure on the this key 3 we will run through the modes in reverse order.

If we are in DVB-T, DVB-S or terrestrial Analog, by using the key 6 we can find the following or the previous channel. *(See channel search section 3.3.3.3)*.

3.3.3.1.4.- Teletext

When this function is selected, the teletext information for the tuned channel will appear on screen (if the channel has no information, the following message will be displayed: NO TTX).

The teletext representation level is 1.5.

- Teletext window -

We can browse through the teletext pages using the . We will be able to directly access a teletext page by pressing the key Freq. and then introducing the page number. If we press the teletext key again, viewing will end.

The teletext may only be viewed in Television, MPEG or Combo mode.

Viewing of Teletext can only be done from the Television, MPEG or Combo modes.

3.3.3.2.- Measures

From this menu, we access the ***different measures of the meter***.

When we select a given measure, a window will open showing the measurement that has been carried out and the frequency (or the channel) on which the measurement was made, corresponding to the frequency (or the channel) that the user had tuned into.

The tuned frequency can vary while one is viewing the measurement window. Thus we can carry out the same measurement on successive frequencies (or channels) quite simply.

To vary the frequency, use the or the numerical keyboard. To introduce the frequency on the keyboard press key

until the frequency information appearing on the window is erased. Then you may type in the frequency using the keyboard.

It is important to remember that for decimal point insertion you should also use the key

.

To introduce the channel using the keyboard, press the key

when in the channel mode, and type in the digits for the desired channel. In the event that more than one channel possesses the same digits, a list will be shown on which the user should select the desired channel.

Each of the measurements shown is accompanied by a symbol that indicates the quality of the signal in regard to that measurement.

These symbols are:

- ⇒ *showing that measurement quality is good*.
- ⇒ *showing that the measurement quality is acceptable, but recommending improvement*.
- ⇒ *it indicates that the quality of the signal for that measurement is poor*.

3.3.3.2.1.- Analogs

The respective sub-menu is shown below:

- Analog Measure Options -

The measure window is shown superimposed over the demodulated image.

On the ***terrestrial band*** using , we can ***alternate between the extended window, the abbreviated window and no window (image only)***.

The **extended window** contains the following information:

- Name of the measure selected
- Value of the measurement
- Frequency or channel on which the measurement is taken
- Previous power
- Channel Plan
- Tone 22KHz
- Color standard (only terrestrial band)
- Audio carrier (only terrestrial band)
- Bandwidth of the measurement filter
- Bar for main measurement selected, graphically shows the quality of the signal. According to its color, we can determine the quality of the signal as far as that measurement:
  - Green bar: good quality

- Yellow bar: acceptable quality, but recommending improvement
- Red bar: bad quality

The **abbreviated window** (only terrestrial band), which only contains:

- Frequency or channel on which the measurement is being made
- Name of the measure selected
- Value of the measurement

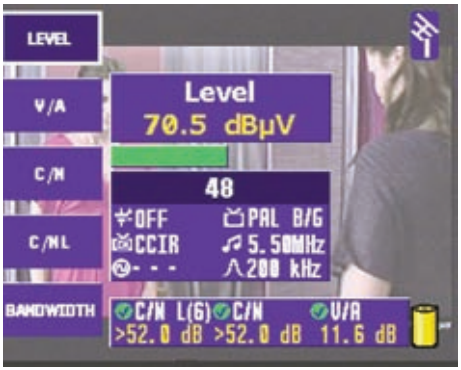
We can change the main measure of each window by using cursors (the cursors are enabled when the menu is hidden).

3.3.3.2.1.1- Level

If the channel tuning mode is selected, this function will measure the level of the carrier for the tuned channel. Contrarily, if the frequency tuning mode is selected, the window will show the signal level of the tuned frequency.

The tuned frequency can be varied by using the **(in the terrestrial band with a resolution of 50 KHz, and satellite also 50 KHz)**, or by using the numerical keyboard.

On the extended window, as well as measuring the level, the C/N and V/A of the terrestrial band and the C/N of the satellite band can be measured.



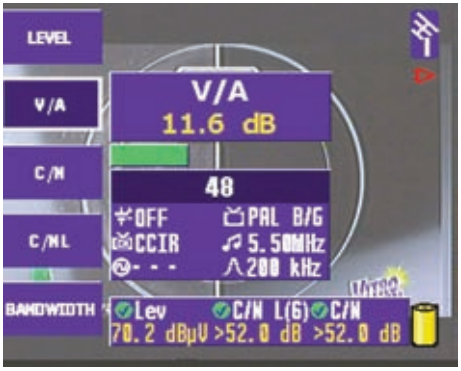
- Extended level measurement -

3.3.3.2.1.2- V/A (only terrestrial band)

The tuned frequency is that taken as video carrier, i.e., that on which the video level is measured. The audio carrier level is taken as many MHz over the value as instructed in the Audio information appearing on screen (5.50 in the example).

Pressure on key

highlights the tuned frequency information. Once this has been done, we may vary the tuning by using the or the numerical keyboard.



- V/A Measure. Tuning by frequency **-**

If we press the key

the information on the tuned channel will appear. In this case, the frequency on which the video level measurement is being made will be the video carrier of the channel that the equipment will automatically seek.

Therefore, when the equipment is in frequency tuning mode, it is the user's responsibility to ensure that the tuned frequency is really the video carrier of the channel on which the V/A measurement is to be taken, for the measurement to be totally accurate.

3.3.3.2.1.3- C/N

On selecting this function, the Carrier/Noise ratio measurement will be selected. Noise measurement is carried out automatically.

- C/N Measurement. Channel tuning -

If the channel tuning mode is used, the channel on whose carrier the level measurement is being taken will appear. As mentioned in the measurement of the V/A ratio, if frequency tuning, is used, the level measurement is made on the frequency tuned by the user, and will depend on that frequency corresponding with the real carrier of the channel.

3.3.3.2.1.4- C/N line

dB Measurement that indicates the ***quality of the analogue image***.

This measurement corresponds to the sound carrier relationship but synchronised to a specific TV line (line 3 and line 25). By default the selected line is line 6, a line that corresponds to a test line.

The user can select any of the TV signal´s active lines using the Line C/NL function (paragraph 3.3.3.2.1.4.1).

3.3.3.2.1.4.1.- Line C/N line

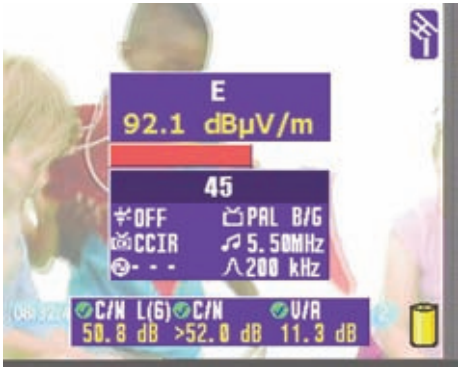
This function allows one to change the line with which one synchronises the meter to, in order to carry out the C/N line measurement. Use the to switch between line 3 and line 25 and confirm by pressing the key.

- C/N Line -

3.3.3.2.1.5.- Field strength

This unit corresponds to a measure of intensity of electric field in a given point. For the accomplishment of this measure we should take into account all the elements, from the signal collection system used (antenna) up to the measuring equipment (prior, cable ...).

For the **H45**, this unit is calculated for a **Televes DAT-HD** antenna and **10 meters** of cable **T100** (for more information, please visit http://www.televes.com).



- Field Strength -

ICT legislation establishes minimum standards that must be taken at the point of signal collection. In the case of terrestrial television you can see the following table:

Signal Type	Frequencies (MHz)	Field Strength
Analog	470 - 582	65 dB(µV/m)
Analog	582 - 830	70 dB(µV/m)
Digital	470 - 862	56.4 - 61.7dB(µV/m) 3+20 log f (MHz) dB(µV/m)

3.3.3.2.2.- Digitals

The same window opens when any of the modulations is selected, but what varies is the heading giving the modulation type and the kinds of measures shown for each type of modulation:

- Digital Measures window -

Any of the available measures can be selected to be viewed on a larger scale than the rest.

Besides, the ***graphic bar-form representation*** is associated with the measure selected, enabling a more visual appreciation of the signal quality in reference to said measure. To show whether the selected measure is within the acceptable threshold, bar fullness and color vary.

When the bar is red, this shows that the signal quality in that ***measure is bad***. When the bar is yellow, his shows that the quality of the signal received in that ***measure is acceptable but its improvement would be convenient***. When the bar is green, it shows that the signal quality for that ***measure is good.***

There is also a graphic indicator associated with each measure (✓, !, ✗) showing if it is at an acceptable threshold. Its color changes through red, yellow and green with the same meaning as the color of the bar associated with the measure.

3.3.3.2.2.1.- DVB-T

On selecting this function, the equipment will carry out the ***measures corresponding to a*** DVB-T ***digital signal.*** The corresponding sub-menu for this type of modulation is as follows:

- DVB-T Measures -

The available measures for a DVB-T signal are: Power, C/N, CBER, VBER and MER.

3.3.3.2.2.1.1.- Parameters

On selecting this menu, a new window opens over that of the BER measures, on which appears the ***list of parameters that may be selected***.

To select the parameter to be modified use the , pressing

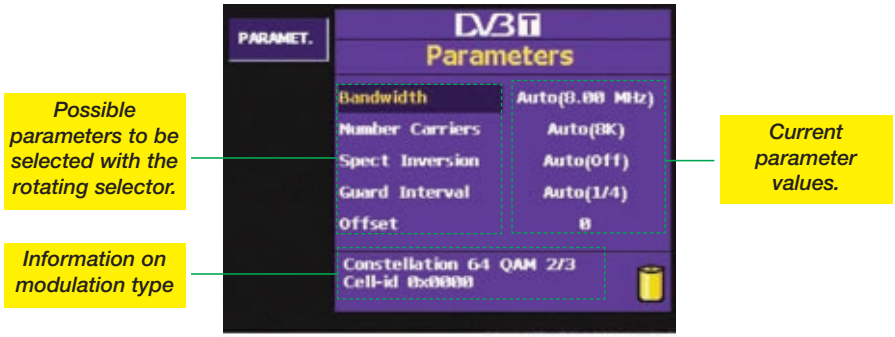
to confirm selection. Then a window opens showing the list with all the possible values for this parameter.

The parameters that can be varied in DVB-T are:

- Bandwidth (from 7.0 to 8.0 MHz and AUTO).
- Number of Carriers (2K, 8K, AUTO)
- Spectrum Inversion (ON, OFF, AUTO)
- Save Interval (1/32, 1/16, 1/8, 1/4, AUTO)
- OFFSET (0, 1/6, 2/6, 3/6, -1/6, -2/6, -3/6, AUTO).

When the AUTO option is selected in any of the parameters, the equipment automatically selects the suitable option even though hookup time will increase.

The following is an example of the parameter selection window:



- DVB-T Parameters -

Pressing OK opens the window corresponding to the selected parameter.

In the Offset section, if the frequency of the COFDM channel has shifted, an offset may be applied (0, 1/6, 2/6, 3/6, -1/6, -2/6, -3/6, Auto) to correct the shift. This will only be valid in the channel mode, and is shown under the current DVB-T channel selection.

Selection can be manual or automatic. When you select an automatic option, the equipment will automatically detect the offset. This may involve a certain delay due to the sweeping of all possible frequency displacements.

The parameter window will show at the bottom the information on the constellation used for each carrier and the code rate as well as the cell identifier (Cell Id.).

3.3.3.2.2.1.2.- BER

This function enables you to return to the BER measures window from another window.

3.3.3.2.2.1.3.- MPEG

Pressing this option ***when we have a DVB-T signal will enable MPEG decoding***. The messages "Initiating MPEG" , "Tuning MPEG" will appear, and then the search for available services will start, the message "Searching Serv..." appearing on screen.

By using the we can access the list of channel services. When we have located the desired service, we press the key to confirm the selection. Afterwards, if there are several available audio channels, we can choose among them. We will also be able to change services when the menus are hidden.

This option has ***three different information windows, one of them reduced, and two extended***. Using quick key , the one to be viewed is selected.

The ***reduced information window*** shows only the frequency or channel tuned, the name of the service selected (if it is a garbled channel, the character # will appear beside the name), and the CBER measure of the DVB-T signal.

In the ***extended information*** windows, the network identifier is also shown (if available), the number of supplier services and other different items of data on the tuned channel in each of the two windows. On the first of the windows these data are: SID, VPID (for audio channels, value 0 will be shown), NID and APID. At the bottom of the window, audio and video information is shown: type of MPEG, video resolution, and audio channel selected among all the available ones. On the second window, the respective data are: Profile and Level ID, video format and audio mode. ***If the service is*** MHP, ***this is also shown***. At the bottom, more information is given on audio and video: frame frequency and aspect ratio, audio bit rate and audio sampling frequency.

- Extended Information -

In the event that no DVB-T signal is available, the information windows will show "UNLOCK".

MPEG4 DVB-T. **Option**

The MPEG4 services decryption is possible in the **H45** (some options).

The **H45** technology allows to display the services up to **1080p** being them compatible with the following digital audio standards: AAC, EAAC and AC3.

The capacity to decode MPEG4 is integrated transparently inside the **H45** for users. It is compatible with the following modulations: **DVB-T/T2**, **DVB-C**, **DVB-S** and **DVB-S2**.

By means of channel services a MPEG-4 service image can be displayed and information about the video and audio can be consulted.

- MPEG4 Decoding -

CAM (Conditional-access module) DVB-T. Option

The **H45** meter has a **Common Interface** slot (CI) in its higher part where a Conditional Access Module (CAM) is inserted.

It is valid for any digital modulation always being compatible with **DVB-CI** and MPEG-2 and MPEG4 services.

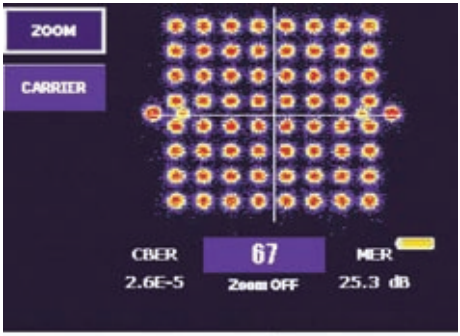
- CAM -

Televes

- CI module introduction -

3.3.3.2.2.1.4.- Constellation Option

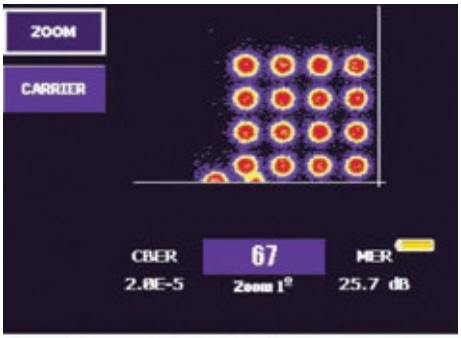
This function represents the DVB-T constellation ***of all the carriers: the TPS carriers plus the disperse carriers, or of a specific selected carrier***. As well as this graphic representation, the same screen shows the CBER and MER measures of the DVB-T signal.



- DVB-T Constellation -

3.3.3.2.2.1.4.1.- Zoom Option

Using this option, a quadrant of the constellation to be represented may be selected for more detailed viewing. When you select "Zoom OFF", the on-screen graphic will expand to the four quadrants.



- DVB-T Constellation Zoom -

3.3.3.2.2.1.4.2.- Carrier Option

The DVB-T transmission of any channel is composed of some 8,000 carriers, of which there are 6,817 usable ones, and they are divided into signal and data carriers.

This function enables the selection of the carriers to be represented. The possibilities are: all the carriers, TPS carriers plus disperse carriers, and a specific carrier. For the latter case, the carrier number should be introduced using the or with the numerical keyboard (previously pressing the key

).

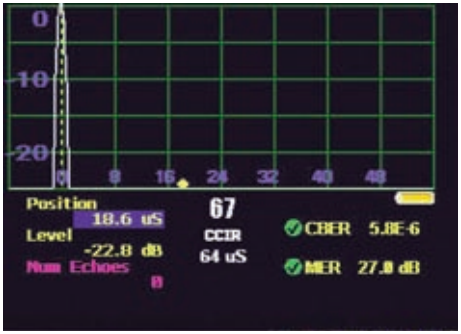
3.3.3.2.2.1.5.- ECHOES Option

The ECHOES option makes it possible to visualise the time response of the DVB-T channel.

This function is very useful to find out if the signal we are receiving comes from a single main beam or if a series of secondary beams have been added with different delays and bandwidths. This will often help to explain why the BER does not have an acceptable value if we have a good C/N and signal level.

Within the echo visualisation mode there is a menu that allows us to select the x-axis units between microseconds or kilometres. Depending on the unit selected, the zoom menu will allow us to vary the visualisation window between the following values:

Units	Zoom
µS	4, 8, 16, 32, 64, 128, 256
Km	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 76.8



- ECHOES -

3.3.3.2.2.1.6.- Error Packets Option

This function allows the H45 to carry out an analysis of the erroneous packages for a prolonged period of time. This period can be defined by the user between 1 and 59 minutes. To change these parameters see paragraph *3.3.3.2.2.1.6.1.*

The values which appear on screen are the following:

Start: Time at which the analysis start.

UncPkts (Uncorrected Packets): Total number of erroneous packages found throughout the actual period of analysis.

ActInt (Actual Interval): Number of errors found in the current period of analysis.

LastInt (Last Interval): Number of errors found in the previous analysis.

WorsInt (Worst Interval): Number of erroneous packages found at the worst viewing interval.

W.I.Start (Worst Interval Start): Time when the worst viewing interval start.

TLock (Time Locked): How long it has been connected to the digital channel.

TErFree (Time Error Free): Time since the last error occurred.

N.Ulock (Number of Unlocks): Total number of times it has disconnected.

MxTUlock (Maximum Time Unlocked): Longest period of time disconnected in some of the connections.

All the parameters can be restarted at any point. To do so, activate the restart function *(see paragraph 3.3.3.2.2.1.6.1)*.

- Error packets -

3.3.3.2.2.1.6.1.- Restart

Pressing this function restarts all the analysis measures.

3.3.3.2.2.1.6.2.- Time

With this function one can modify the duration of the analysis. The length of time can be altered between 1 and 59 minutes, to do this, use the and the key.

3.3.3.2.2.2.- DVB-C

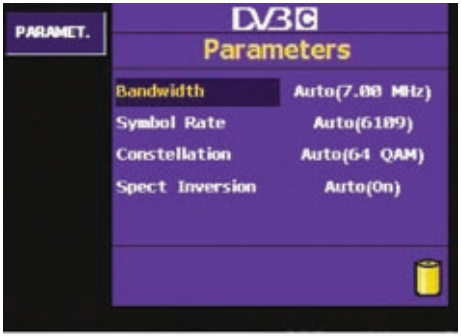
On selecting this function, the equipment makes the measurements corresponding to a digital DVB-C signal. The information window is identical to that of DVB-T measures. The following is the sub-menu corresponding to this function:

- DVB-C Measures -

The measures available for a DVB-C signal are: Power, C/N, CBER and MER.

3.3.3.2.2.2.1.- Parameters

The parameters that may be selected for a DVB-C signal are: Bandwidth (from 1.0 to 8.0 MHz and AUTO), Symbol Velocity (AUTO, 6875, 6111, 5156, 4583, 5893, 5238, 6900, OTHER (6875)), Constellation (4QAM, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, OTHER), and Spectrum Inversion (ON, OFF, AUTO). ***The way in which these parameters are selected is identical to the case of DVB-T.***



- DVB-C Parameter Options -

3.3.3.2.2.2.2.- BER

This function enables the viewing again of the BER measure window from another window.

3.3.3.2.2.2.3.- MPEG

Pressing this option when we have a DVB-C signal will enable ***MPEG decoding***. The messages "Initiating MPEG", and "Tuning MPEG" will appear, and then the search for available services will start, the message "Searching Serv..." appearing on screen.

By using the we can access the list of channel services. When we have located the desired service, we press the key to confirm the selection. Afterwards, if there are several available audio channels, we can choose among them. We will also be able to change services when the menus are hidden.

This option has ***three different information windows, one of them reduced, and two extended***. Using quick key , the one to be viewed is selected.

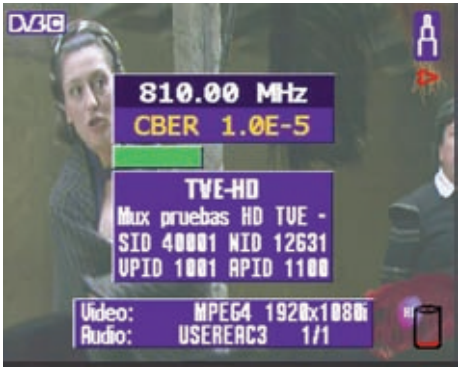
The ***reduced information window*** shows only the frequency or channel tuned, the name of the service selected (if it is a garbled channel, the character # will appear beside the name), and the CBER measure of the DVB-C signal.

In the ***extended information*** windows, the network identifier is also shown (if available), the number of supplier services and other different items of data on the tuned channel in each of the two windows. On the first of the windows these data are: SID, VPID (for audio channels, value 0 will be shown), NID and APID. At the bottom of the window, audio and video information is shown: type of MPEG, video resolution, and audio channel selected among all the available ones. On the second window, the respective data are: Profile and Level ID, video format and audio mode. ***If the service is*** MHP, ***this is also shown***. At the bottom, more information is given on audio and video: frame frequency and aspect ratio, audio bit rate and audio sampling frequency.

In the event that no DVB-C ***signal is available, the information windows will show "***UNLOCK***".***

MPEG4 DVB-C. Option

It works similarly to the MPEG-4 DVB-T section.



- MPEG4 Decoding -

CAM (Conditional-access module) DVB-C Option

It works similarly to the CAM DVB-T section.

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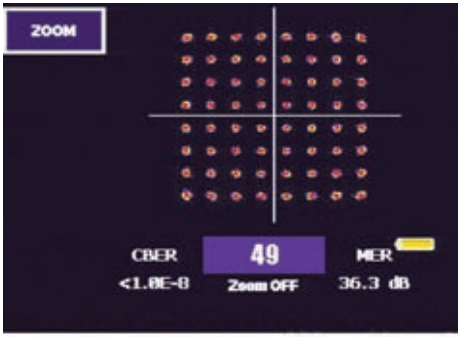
3.3.3.2.2.2.4.- Constellation Option

This function represents the DVB-C signal constellation. As well as showing this graphic representation, the screen shows the CBER and MER of the DVB-C signal.



- DVB-C Constellation -

3.3.3.2.2.2.4.1.- Zoom Option

Using this option, a quadrant of the constellation to be represented may be selected for more detailed viewing. When you select "Zoom OFF", the on-screen graphic will expand to the four quadrants.

3.3.3.2.2.2.5.- Error packets Option

This function analyses the erroneous DVB-C signal packages. It works in a similar way to the DVB-T.

3.3.3.2.2.3.- DVB-S

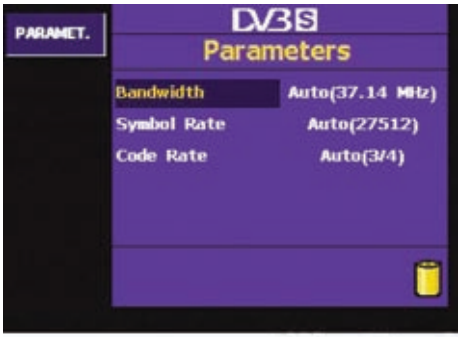
This function carries out the measurements of a digital DVB-S signal. ***The information window is identical to that of the*** DVB-C and DVB-T. The following sub-menu appears on selecting this function:

- DVB-S measures -

The measures available for a DVB-S are: Power, C/N, CBER, VBER and MER.

3.3.3.2.2.3.1.- Parameters

The possible parameters that may be selected for a DVB-S signal are as follows: Bandwidth (from 2.0 to 40.0 MHz and AUTO), Symbol velocity (AUTO, 27500, 24500, 22000, 15000, OTHER) and Code Rate (AUTO, 1/2, 2/3, 3/4, 5/6, 7/8). The parameters are selected in the same way as previously.



- DVB-S Parameter Options-

Selection of the AUTO mode is recommended for all the parameters. The DVB-S signal will hook up almost immediately.

3.3.3.2.2.3.2.- BER

This function enables the viewing again of the BER measure window from another window.

3.3.3.2.2.3.3.- MPEG

Pressing this option when we have a DVB-S signal will enable MPEG decoding. The messages "Initiating MPEG", and "Tuning MPEG" will appear, and then the search for available services will start, the message "Searching Serv..." appearing on screen.

By using the we can access the list of channel services. When we have located the desired service, we press the key to confirm the selection. Afterwards, if there are several available audio channels, we can choose among them. We will also be able to change services when the menus are hidden.

This option has ***three different information windows, one of them reduced, and two extended***. Using quick key , the one to be viewed is selected.

The ***reduced information*** window shows only the frequency or channel tuned, the name of the service selected (if it is a garbled channel, the character # will appear beside the name), and the CBER measure of the DVB-S signal.

In the ***extended information*** windows, the network identifier is also shown (if available), the number of supplier services and other different items of data on the tuned channel in each of the two windows. On the first of the windows these data are: SID, VPID (for audio channels, value 0 will be shown), NID and APID. At the bottom of the window, audio and video information is shown: type of MPEG, video resolution, and audio channel selected among all the available ones. On the second window, the respective data are: Profile and Level ID, video format and audio mode. ***If the service is*** MHP, ***this is also shown***. At the bottom, more information is given on audio and video: frame frequency and aspect ratio, audio bit rate and audio sampling frequency.

In the event that no DVB-S, ***signal is available, the information windows will show*** "UNLOCK".

MPEG4 DVB-S Option

It works similarly to the MPEG-4 DVB-T section.

- MPEG4 Decoding -

CAM (Conditional-access module) DVB-S Option

It works similarly to the CAM DVB-T section.

3.3.3.2.2.3.4.- Error Packets Option

This function analyses the erroneous DVB-S signal packages. It works in a similar way to the DVB-T.

3.3.3.2.2.4.- DVB-S2 Option

This functionality enables the obtaining of quality measurements of a DVB-S2 signal. The information window is identical to that of the measures DVB-S, DVB-C and DVB-T. The following sub-menu appears on selecting this function:

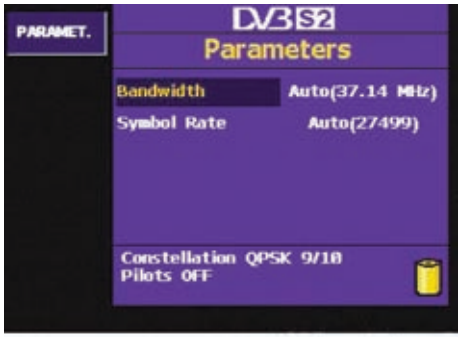
- DVB-S2 Measures -

The measure used for evaluating signal quality is Link Margin (dB), ***that indicates how "far away" the signal is from the degradation point. Therefore, the greater the Link Margin, the better the signal***. As well as this measure, three others are given: CBER, MER and BCHBER (BCH error correction algorithm bit error rate).

The available measures for a DVB-S2 are: Power, C/N, Link Margin, BER, BCHBER and MER.

3.3.3.2.2.4.1.- Parameters Option

The only parameter necessary to define for DVB-S2 ***signal measurement is*** symbol velocity. The parameter of speed symbol can be in AUTO mode (in this case the meter will automatically identify the symbol rate; once found it can be displayed in the window of parameters), or may it can be selected from the dropdown velocities of most likely symbol. You can also enter the symbol rate directly using the keypad. The meter has defined the most common: 27500, 24500, 22000, 15000, but you can also enter any other value by using the numeric keypad.



- DVB-S2 Parameter Options -

3.3.3.2.2.4.2.- BER Option

This function enables the viewing again of the BER measure window from another window.

3.3.3.2.2.4.3.- MPEG Option

Clicking on this option when we have a DVB-S2 signal, MPEG2 services will be displayed at standard resolution or up to 1080p of MPEG services (599201, 599001 or 5997). You will see the messages "Initiating MPEG", "Tuning MPEG" and then start searching for available services indicated on screen "Searching Serv..."

By using the we can access the list of channel services. When we have located the desired service, we press the key to confirm the selection. Afterwards, if there are several available audio channels, we can choose among them. We will also be able to change services when the menus are hidden.

This option ***has three different information windows, one of them reduced, and two extended***. Using quick key , the one to be viewed is selected.

The ***reduced information*** window shows only the frequency or channel tuned, the name of the service selected (if it is a garbled channel, the character # will appear beside the name), and the CBER measure of the DVB-S2 signal.

In the ***extended information*** windows, the network identifier is also shown (if available), the number of supplier services and other different items of data on the tuned channel in each of the two windows. On the first of the windows these data are: SID, VPID (for audio channels, value 0 will be shown), NID and APID. At the bottom of the window, audio and video information is shown: type of MPEG, video resolution, and audio channel selected among all the available ones. On the second window, the respective data are: Profile and Level ID, video format and audio mode. ***If the service is*** MHP, ***this is also shown***. At the bottom, more information is given on audio and video: frame frequency and aspect ratio, audio bit rate and audio sampling frequency.

In the event that no DVB-S2 ***signal is available, the information windows will show*** "UNLOCK".

MPEG4 DVB-S2 Option

It works similarly to the MPEG-4 DVB-T section.

- MPEG4 Decoding -

CAM (Conditional-access module) DVB-S2 Option

It works similarly to the CAM DVB-T section.

3.3.3.2.2.4.4.- Constellation Option

This function represents the constellation of the DVB-S2 signal. As well as this graphic representation, the same screen shows the Link Margin and MER measures of the DVB-S2 signal.

- DVB-S2 Constellation -

3.3.3.2.2.4.4.1.- Zoom Option

Using this option, a quadrant of the constellation to be represented may be selected for more detailed viewing. When you select "Zoom OFF", the on-screen graphic will expand to the four quadrants.

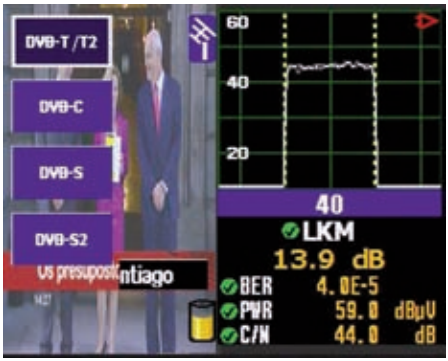
3.3.3.2.2.4.5.- Error Packets Option

This function analyses the erroneous DVB-S2 signal packages. It works in a similar way to the DVB-T.

3.3.3.2.2.5.- DVBT-2 Option

With this option, when the DVB-T/T2 mode is selected, the device automatically analyses the digital terrestrial signal and detects the signal type. If it is a DVB-T signal, the meter will activate the DVB-T functions.

If it detects a DVB-T2 signal, the main measurement will be LinkMargin, Power, C/N, LDPCBER, BCHBER and MER.

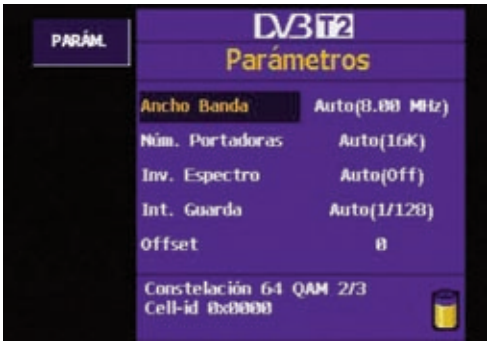


- DVB-T2 Combo Mode -

3.3.3.2.2.5.1-Parameters Option

The modulation parameters can be changed using this function. The device can automatically detect all the parameters required for demodulation. Once demodulation occurs, the parameters are displayed to the right of the word AUTO.

Carriers	1K,2K, 4K, 8K 16 K 32 K
Extended Mode	8K, 16K y 32K
Modulations	QPSK, 16QAM, 64QAM y 256 QAM
Pilot Pattern	PP1-PP8
Guard Interval	1/128, 1/32, 1/16, 1/8, 19/128 y 19/256
Code Rate	½, 3/5, 2/3, ¾, 4/5, 5/6



- DVB-T2 Parameters -

3.3.3.2.2.5.2.-BER Option

Use this feature to go back to the BER measurement window from other windows.

- BER Mode -

3.3.3.2.2.5.3.- MPEG Option

Clicking on this option when the DVB-T2 signal is available will activate MPEG decoding.

When this option is selected, MPEG2 and MPEG4 services can be decoded.

H45 technology enables you to get services of up to 1080p and is compatible with audio standards: AAC, EAAC and AC3.

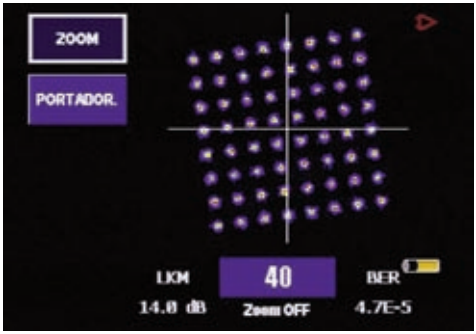
Using the rotary switch, you will be able to access the list of channel services. When the desired service has been found, press OK to confirm the selection. Then, if the service has multiple audio channels available, select the desired channel.

This option offers three different information windows: one small and two extended. Using the hotkey 1, you can select the view of your choice.

- DVB-T2 MPEG -

3.3.3.2.2.5.4.- Constellation Option

This feature represents constellation DVB-T2. Along with this graphical representation, the calculated LDPCBER and MER measurements are also displayed on the same screen.



- DVB-T2 Constellation -

3.3.3.2.2.5.4.1.- Zoom Option

Use this option to select the quadrant for the constellation to be displayed for a detailed view. If you select “Zoom OFF”, the on-screen graph will cover all four quadrants.

3.3.3.2.2.5.5.- Error packets Option

Using this feature, you can analyse error packets in an extended period of time. The operation is similar to DVB-T.

3.3.3.2.3.- A/D AUTO

This function of the **H45** meter makes it possible to automatically identify the type of channel: analogue or digital.

The AUTO A/D function is only available for the ***TV mode*** and ***Combo mode***.

This mode may also be accessed quickly by holding down the key for more than 1 second.

- A/D Auto -

3.3.3.3.- Channel search

The **H45** incorporates the ***automatic channel search function***.

Channel Search is a simplified function of the SCAN&LOG.

If you wish the meter to ***search for channels, identify them and carry out measuring*** automatically, consult the SCAN&LOG section.

The search for terrestrial channels will always be carried out based on the channel plan that we have selected. Using the satellite mode, the search will be based on the tuning mode we are showing: by channel plan or frequency.

3.3.3.3.1.- Next channel

Selecting this function or if we press the key , the meter will search for the next position occupied by a channel, identifying in the case of the terrestrial band, whether it is an analog or digital channel and, after tuning in on the channel, the meter will adopt the respective setting (digital or analog).

3.3.3.3.2.- Previous channel

If we select this function or if we apply ***prolonged pressure to the key*** , the meter will search for the previous position occupied by a channel, identifying in the case of the terrestrial band, whether it is an analog or digital channel and, after tuning in on the channel, the meter will adopt the respective setting (digital or analog).

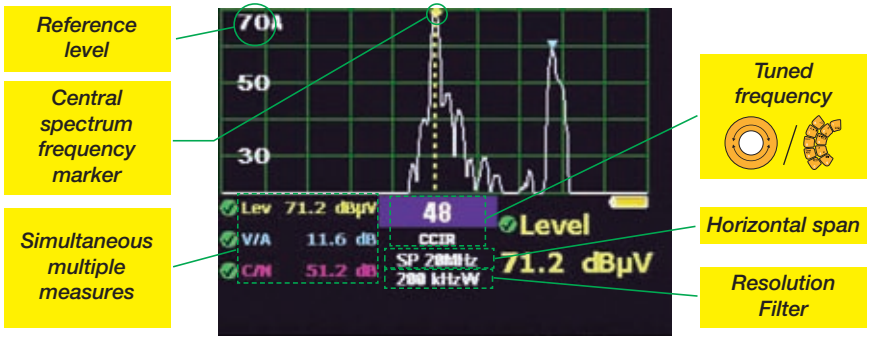
3.3.4.- Analyzer

If this menu is chosen, you will automatically go to the spectrum analyzer mode. In this mode you will see the signal spectrum according to the selected span and the tuned frequency. The lower part of the screen (under the spectrum) is used to show the measures, parameters, etc.

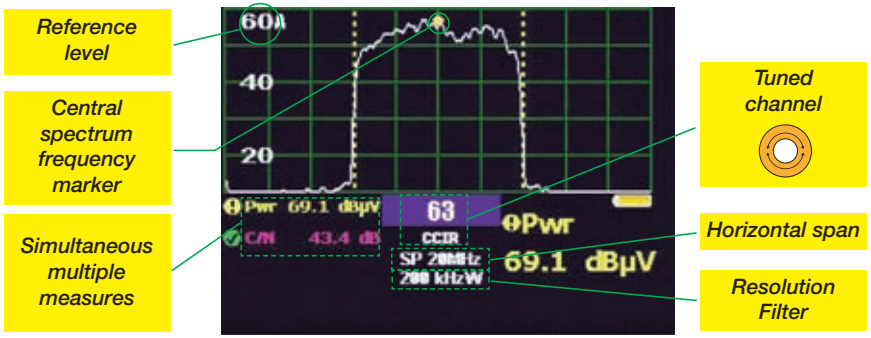
The menu texts are hidden by default, with the purpose of complete spectrum viewing. When the user needs to access the menus, he can do so by simply pressing the following key

.

If any analog measure is selected, at the central part of the spectrum you will see an interrupted yellow line (dashes), while if any digital measure is selected, this line will not appear, being replaced by two interrupted yellow lines at equal distances from the central line of the spectrum. ***The separation between these lines shows the bandwidth*** of the channel which is selected at that moment.



- Spectrum analyzer mode. Frequency tuning (analogue channel) -



- Spectrum analyzer mode. Channel tuning (digital channel) -

The tuned channel or frequency information appears in the middle of the bottom part of the screen. If the equipment is in frequency mode, the central frequency of the spectrum will appear. Using , we will go varying the central frequency of the spectrum, i.e., displacing the spectrum to one side or the other.

If the equipment is in channel tuning mode, the channel corresponding to the tuned frequency will appear, and the spectrum will center itself automatically on the video carrier frequency of that channel, if we are in the analog mode. In the digital mode, it will position itself at the center of the channel.

If we use the in the channel mode, we will go to the next channel, and the spectrum will move to the next video carrier.

The sub-menu corresponding to the Analyzer mode is the following:

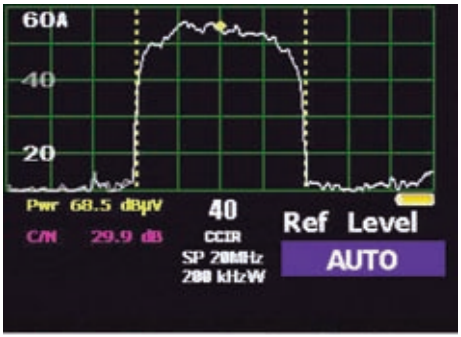
- Analyzer mode options -

3.3.4.1.- Reference level

This enables the user to ***choose the reference level*** (the highest level) of the spectrum, so as to optimize signal spectrum viewing according to level.

The reference level corresponds to the value of the highest line of the spectrum. Possible values ***vary from 60 dBµV up to 130 dBµV in steps of 1, 2, 5 or 10, according to the reference level***.

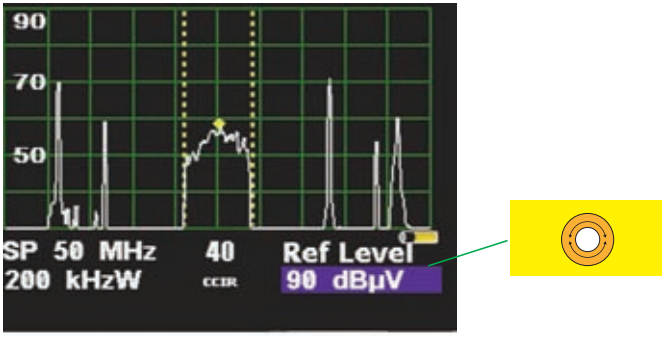
The new **H45** has an AUTO mode for the reference level. Once this function is selected, the meter will automatically detect the optimum reference level for each situation. It will also indicate that the meter is in auto reference mode, adding an “A” to the number that shows the value of the upper line.



- Mode AUTO -

When this function is pressed, the main measure momentarily disappears, and in its place the reference level options appear, which may be changed by using the or the /, keys, until we confirm by using key or .

Thereupon, the information on the reference level disappears, and the information on the selected level reappears.

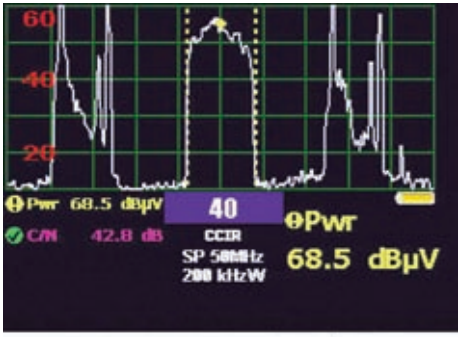


- Selecting a reference level -

As the value is changed, these changes may be observed in the spectrum. This makes it easy to know what the optimal reference level is for viewing the signal spectrum.

A quick way of changing the reference level is by using keys when the menu is hidden. thus the reference level may be quickly changed to adapt it to the current signal.

When the ***input signal level is excessive for the selected reference level, this is shown when the numbers indicating the level of each horizontal division are in red***. Likewise, the number that indicates the reference level will blink, showing the user that he must increase the reference level to avoid saturation.



- Saturated spectrum -

3.3.4.2.- Span

Using this function one can ***vary the range of frequencies represented in the spectrum***. The information for selecting this parameter appears at the lower right of the screen. Just as in the previous case, the information on the selected measure disappears momentarily, being replaced with the information on the span.

The different options for this parameter will appear on turning the or pressing

On pressing key or , the selected span is validated, and the selected measure reappears.

If the menus are hidden, you may use the cursor keys to directly reduce or increase the span.

The selectable values (depending on the meter options) are: 100 KHz to FULL SPAN (2.5GHz).

3.3.4.3.- Measures

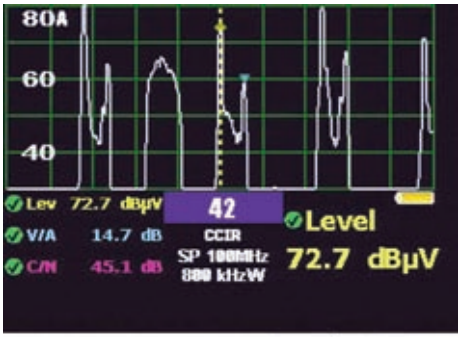
In the **H45**, the measures are viewed on the lower part of the screen. At the bottom left of the screen all the measures are shown, i.e., Level, V/A and CN for analog terrestrial channels, Level and C/N for analog satellite channels, or Power and C/N for digital channels.

At the bottom right of the screen, the main measure selected will be displayed in large-sized characters to ease reading when the user is at a distance from the equipment.

Each measure is associated with a color code, enabling the user to make a rapid evaluation of the channel selected.

3.3.4.3.1.- Analog Measures

When this function is selected, the meter will carry out analog measurements, selecting as its main measure the last one chosen by the user.



- Signal level -

3.3.4.3.1.1.- Level

This is the function used to select the ***level measure as a main measure***, and it may be viewed at the bottom right of the screen. The frequency in which the measurement is made is the central frequency of the spectrum.

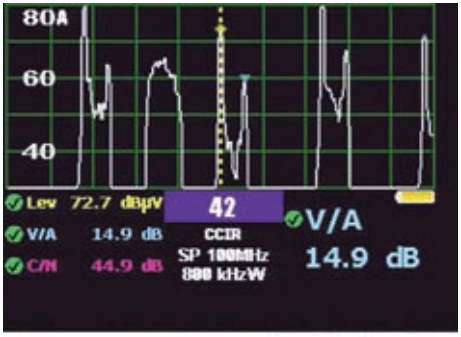
When we vary this central frequency we will see that the level measurement varies also.

3.3.4.3.1.2.- V/A

When you select this function, you choose the ***measurement of the Video Carrier Level / Audio Carrier Level ratio as a main measure***.

The central frequency of the spectrum is taken as the video carrier frequency, and the frequency indicated in the audio carrier selection is taken as that of the audio carrier (this function is in Config. Measure => Channels/Standards => Audio Carrier).

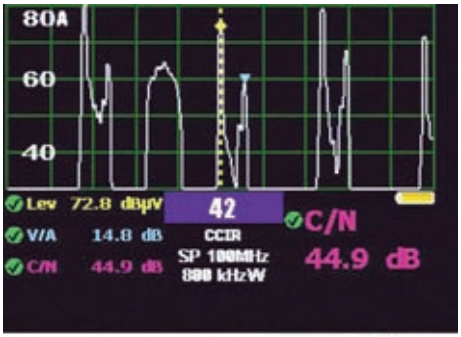
This measure is only possible on the terrestrial band.



- V/A Measure -

3.3.4.3.1.3.- C/N

In the same way as with the V/A measure, on selecting this function, the main measure becomes the ***Carrier / Noise Power ratio***. The carrier level is taken on the central frequency and the frequency for measuring the noise power is calculated automatically by the equipment.



- C/N Measure -

3.3.4.3.1.4.- Field Strength

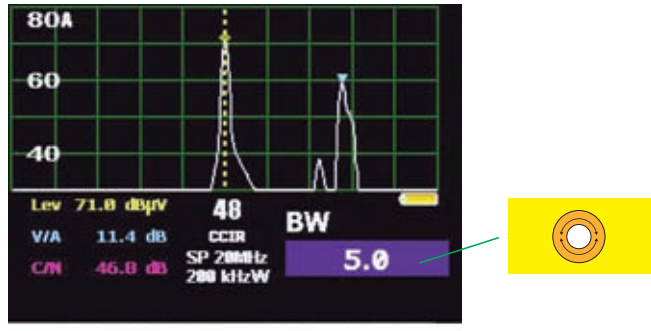
Operation similar to paragraph 3.3.3.2.1.5 field strength.

3.3.4.3.1.5.- Bandwidth

This parameter is necessary for the proper measurement of the ***C/N, since it will be used to correct the value of the noise level measured***, so as to reference it to the whole bandwidth of the channel.

When it is selected, it will be seen at the bottom right of the screen, and the measure selected will momentarily disappear.

With or the cursors we can vary this parameter, and confirm the value by using the keys or .



- Bandwidth change -

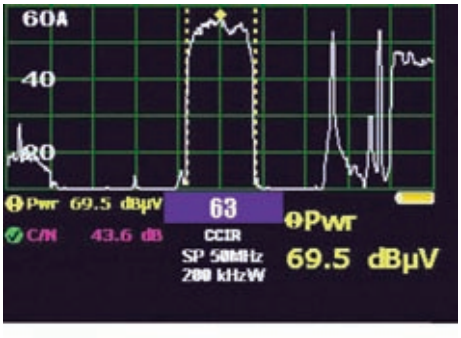
3.3.4.3.2.- Digital Measures

On selecting this function, the meter will go to the digital measuring mode, selecting as a main measure the last one applied by the user.

3.3.4.3.2.1.- Power

Using this function, the measure of power is selected as a main measure, and will be seen at the bottom right of the screen. In this measure, the meter combines the power of the signal comprised between the central frequency minus half the bandwidth of the channel and the central frequency plus half the bandwidth of the channel.

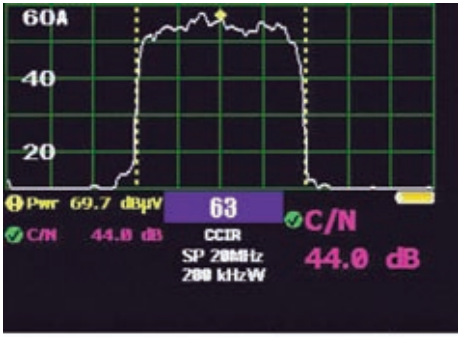
To ensure this measurement is correctly made, we must select the correct bandwidth.



- Power of a digital channel -

3.3.4.3.2.2.- C/N

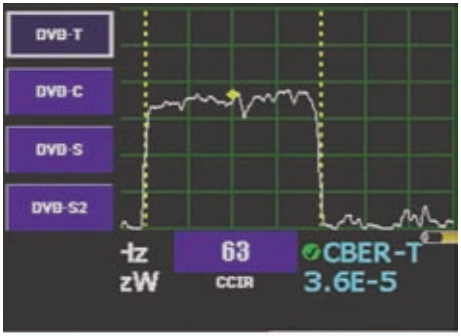
On selecting the C/N measure, the meter will show at the lower right of the screen ***the Channel Power / Noise Power ratio***.



- C/N Measure of a digital channel -

3.3.4.3.2.3.- BER Option

With this function the **H45** enables one to measure the ***parameters of signal quality*** for the different digital modulations whilst viewing the spectrum. CBER measures are taken for the DVB-T, DVB-S, DVB-C and link margin for DVB-S2.



- BER measurement -

Once this function has been activated, the measurement for the last type of digital modulation selected will appear. The different modulations as well as their parameters can be modified using the following functions:

DVB-T, DVB-C, DVB-S, DVB-S2

One can access this function by pressing and holding down the key (> 1 sec). Doing this will activate or deactivate the BER spectrum function.

To come out of this function, simply select another measurement or press the key (Press and hold > 1 sec) and select the deactivation of this function.

- Activate/ Deactivate the BER function -

For the terrestrial band, the available modulations (**DVB-T** and **DVB-C**) the selected SPAN must be less than 20 MHz, otherwise the message SP>20 MHz will appear in the BER measurement and the measurements cannot be taken. In satellite mode (**DVB-S** and **DVB-S2**) this size limit does not exist and any SPAN can be analysed.

3.3.4.3.2.3.1.- DVB-T

With this function one can activate the CBER measurement for a **DVB-T** channel

3.3.4.3.2.3.2.- DVB-C

With this function one can activate the CBER measurement for a **DVB-C** channel

3.3.4.3.2.3.3.- DVB-S

With this function one can activate the CBER measurement for a **DVB-S** channel

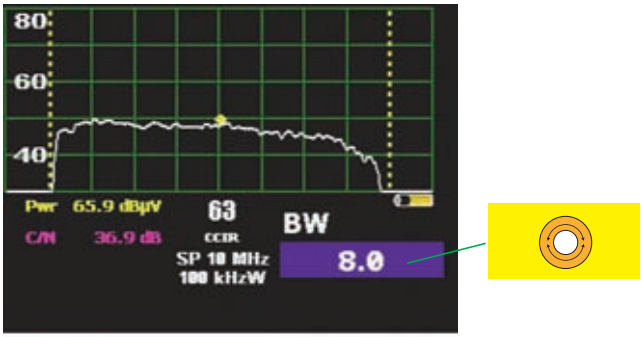
3.3.4.3.2.3.4.- DVB-S2

With this function one can activate the CBER measurement for a **DVB-S2** channel

3.3.4.3.2.4.- Bandwidth

This parameter is necessary for the correct measurement of those of Power and of C/N, since the minimum and maximum channel frequencies will be indicated.

When it is selected, it appears at the bottom right of the screen, and the selected measure momentarily disappears. Using the or the cursors , we can vary this parameter, confirming the value with the keys or .



- Digital channel bandwidth change -

Note: In the **Auto** mode, the bandwidth of the channel plan is selected automatically.

3.3.4.3.3.- Satellite identification

This function allows one to identify the relevant satellite name for the signal trace seen in analyser mode.

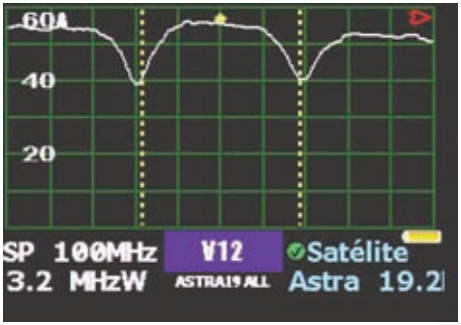
To get to this function we must be on ***analyser mode*** and on ***satellite band***, otherwise the meter will advise with the message "SATELLITE ONLY".

Once the function has been activated in analyser mode and both in analogue or digital, a flickering message will appear on the bottom right SEARCHING. Once the search is complete satellite identification appears. If the identifier has not been standardised (according to EN ETR 162) a numeric identifier will appear.

Pressing the key takes one to this function. Once this function has been activated, pressing the same key again will deactivate it and the meter will continue to take the current

active measurements.

Note: Satellite identification uses the coded information in the MPEG Transport stream according to the EN ETR 162. It is the operators' responsibility to follow these standards and not doing so may result in identification errors.

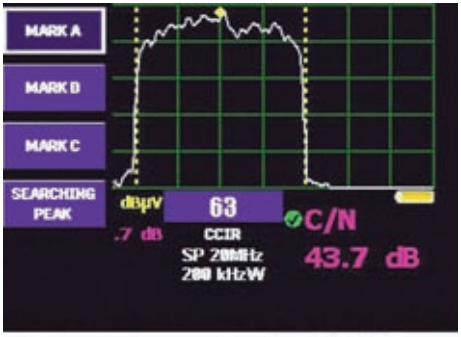


- Satellite identification -

3.3.4.4.- Markers

The **H45** gives you the chance of using one/three markers (depending on the model) in the spectrum. Using the functions of this sub-menu, we can move them throughout the spectrum to carry out ***level measurements at the marked frequencies***.

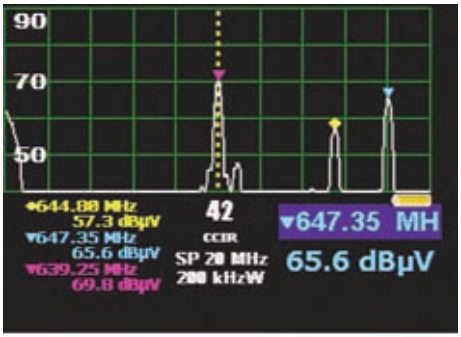
The following is the respective sub-menu:



- Marker options -

3.3.4.4.1.- Marker A

Using this option, we enable the yellow marker, and to disable it, we can select the option again, or choose a measure from ANALYZER ⇒ MEASURES.



- Markers -

3.3.4.4.2.- Marker B Option

Using this option, we enable the blue marker, and to disable it, we can select the option again, or choose a measure from ANALYZER ⇒ MEASURES.

3.3.4.4.3.- Marker C Option

Using this option, we enable the fuchsia marker, and to disable it, we can select the option again, or choose a measure from ANALYZER ⇒ MEASURES.

3.3.4.4.4.- Search for Peaks

This option ***locates the selected marker on the highest level frequency of all those displayed on screen***.

3.3.4.4.4.1.- Maximum Peak

This option ***positions the selected indicator at the frequency with the highest level from those shown on the screen***.

3.3.4.4.4.2.- Next Peak

From the current marker, ***it searches for the next peak frequency, using the current position of the marker***. Or select using key , when the menus are hidden.

3.3.4.4.4.3.- Previous Peak

From the current marker, ***it searches for the previous maximum frequency, using the current position of the marker***. Or select using key , when the menus are hidden.

3.3.4.4.4.4.- Upper Peak

From the current marker, ***it searches for the upper maximum frequency, using the current position of the marker***. Or select using key , when the menus are hidden.

3.3.4.4.4.5.- Lower Peak

From the current marker, ***cit searches for the lower maximum frequency, using the current position of the marker***. Or select using key , when the menus are hidden.

3.3.4.5.- HOLD mode

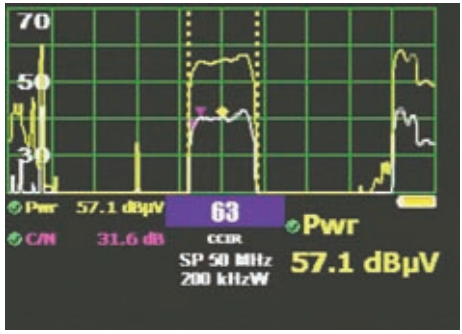
This function allows one to select the trace type seen on screen. One can choose between the ***maximum function*** and the ***minimum function***. To scroll through the display list use the and confirm the selected function using the key.

It is generally used for holding pulsatory signals or interferences as well as narrow modulations.

3.3.4.5.1.- Maximum (On/Off)

Using this function you enable/disable the representation of maximums. On enabling this functionality, ***a new yellow-colored graph appears, indicating the maximum signals at each point***. When this function is selected again, the yellow graph disappears. In both cases, the white-colored graph will continue to represent the instant signal.

Whenever any of the parameters of the spectrum is modified (Reference level, Span, ...), the graph representing the maximums will erase and the maximums will again accumulate as from that moment under the new selection conditions.



- Maximum -

3.3.4.5.1.- Minimum (On/Off)

Using this function you enable/disable the representation of minimums. On enabling this functionality, ***a new yellow-colored graph appears, indicating the minimum signals at each point***. When this function is selected again, the yellow graph disappears. In both cases, the white-colored graph will continue to represent the instant signal.

Whenever any of the parameters of the spectrum is modified (Reference level, Span, ...), the graph representing the minimums will erase and the minimums will again accumulate as from that moment under the new selection conditions.

3.3.4.6.- dB / DIV

With this parameter, the user can ***select the dB number that is represented on screen.***

Once this function has been selected, the information on the measure will disappear, in its place showing the dB/DIV. Using the or with the cursors , we can vary this parameter, and confirm with the keys or .

The possible values for this parameter, depending on the options, are: 1, 2, 5 or 10 dB/DIV. **(Option)** and 5, 10 dB/DIV **(Option)**.

3.3.4.7.- Advanced Measurements Option

This mode enables the activation of the spectrum analyser functions. The functions that can be activated are detailed below:

3.3.4.7.1.- RBW

This function allows one to modify the resolution filter. To do so and once activated the current filter appears on the bottom right. To modify this filter use the and confirm using the key.

The resolution filters available as well as their relation to the SPAN can be seen on the following chart. The default filter is that selected automatically by the unit depending on the span function.

SPAN	Resolution filter	SPAN	Resolution filter	SPAN	Resolution filter
100 KHz	600 HzW (default filter) 300 HzW 1 KHz	5 MHz	800 KHzW 1.6 MHzW 3.2 MHzW 6.4 MHzW	200 MHz	3.2 MHz (default filter) Other filters between (200KHzW and 6.4MHzW)
200 KHz	2.4 KHzW (default filter) 1 KHzW 4.8 KHzW			500 MHz	3.2 MHz (default filter) Other filters between (200KHzW and 6.4MHzW)
500 KHz	9 KHzW (default filter) 4.8 KHzW 18 KHzW	10 MHz	800 KHzW (default filter) Other filters between (200KHzW and 6.4MHzW)	1.0 GHz	3.2 MHz (default filter) Other filters between (200KHzW and 6.4MHzW)
1 MHz	9 KHzW (default filter) 4.8 KHzW 18 KHzW	20 MHz	800 KHzW (default filter) Other filters between (200KHzW and 6.4MHzW)	1.5 GHz	3.2 MHz (default filter) Other filters between (200KHzW and 6.4MHzW)
2 MHz	36 KHzW (default filter) 18 KHzW 110 KHzW	50 MHz	800 KHzW (default filter) Other filters between (200KHzW and 6.4MHzW)	2.0 GHz	6.4 MHz (default filter) Other filters between (200 KHzW and 6.4MHzW)
5 MHz	200 KHzW (default filter) 300 KHzW 400 KHzW	100 MHz	3.2 MHz (default filter) Other filters between (200KHzW and 6.4MHzW)	SPAN FULL	6.4 MHz (default filter) Other filters between (200 KHzW and 6.4MHzW)

Once the filter has been modified, when modifying the SPAN parameter, this goes back to the default configuration according to the SPAN.

3.3.4.7.2.- VBW

This option allows one to modify the video filter. The unit automatically selects the most appropriate one according to its mode.

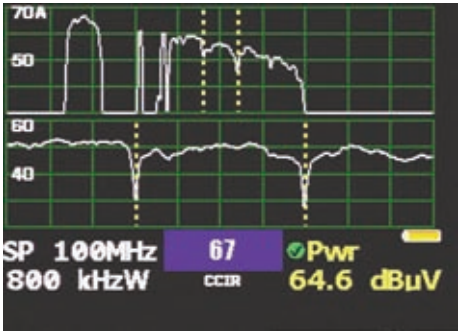
To modify this parameter once the function has been activated, the current filter appears at the bottom of the screen. Using the allows one to browse through the different alternatives. Confirmation of choice is done by pressing the OK key.

The possible alternatives vary between 100Hz and 1 MH.

3.3.4.7.3.- ZOOM mode

This function allows one to see two spectrum traces on screen. At the top one can see the current SPAN and on the bottom there is always a 20 MHz SPAN.

Pressing the Zoom Mode button brings up a contextual menu where one can activate/deactivate this mode.



- Zoom in spectrum -

Pressing and holding down the key (>1 sec) enables us to activate / deactivate this mode.

All the parameters which can be modified in the spectrum analyser continue to work for the

top trace. The Span, Reference Level, RBW etc, as well as the different measurements of this trace can therefore be modified, in the same way as explained in the relevant paragraphs.

3.3.4.7.4.- SWEEP

This function enables one to chose from three types of sweep: ***normal***, ***fast*** and ***accurate*** sweep.

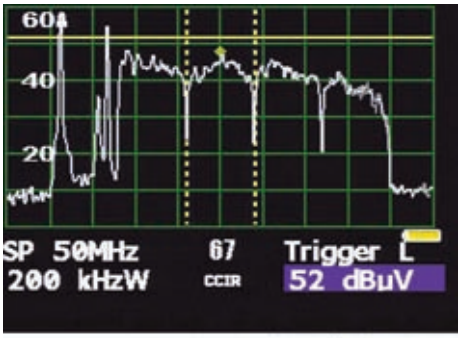
Do so use the and press the key to confirm.

3.3.4.7.5.- Trigger mode

This function enables the detection of pulsatory signals. To do so programme the trigger level, which may vary between -10dBµV and 120dBµV, by using the and the key to confirm.

If the maximum level of the input signal is greater than that value a representation will appear on the spectrum screen.

To deactivate this function, one can select the OFF mode from the same menu as the trigger level.



- Trigger mode -

3.3.4.8.- 3,3GHz extended spectrum Option

This function gives the meter the ability to have a spectrum analyzer with an operating frequency range covering from 5MHz up to 3.3 GHz

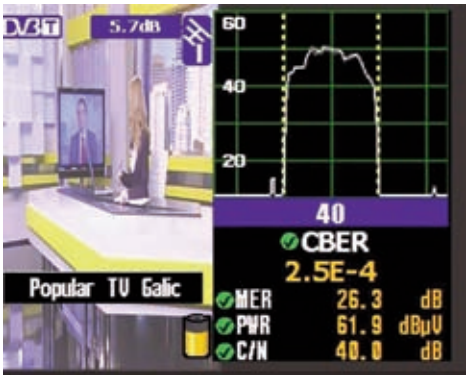
In extended spectrum, you can use the features available on the meter: Advanced measurements, Zoom, Maximums and Marks.

3.3.5..- Optical input/RF Option

With this option in the meter, it is possible to make optical measurements.

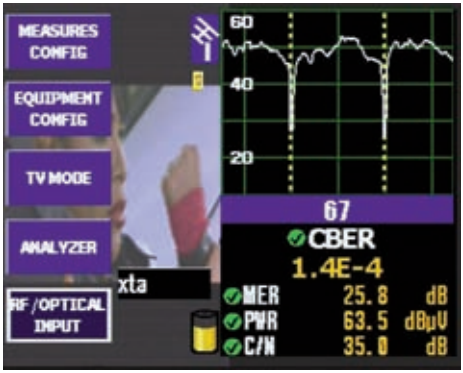
From the main menu, use this option to select the input type to make your measurements: RF / optical.

When the optical input is selected, the meter will show the optical measurement, along with any other measurements, in all measurement modes: Combo, Analyzer and TV.



- Optical input -

The optical measurement will also be recorded in the Datalogs and the graphs.



- Input Selection -

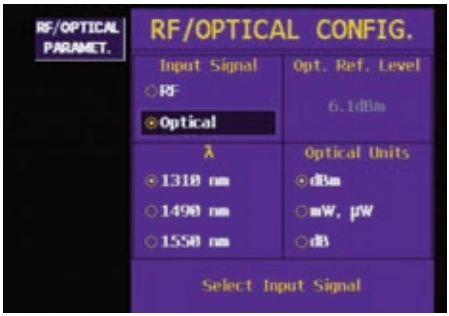
NOTE:
RF power/level measured in optical mode may not match the power/level present at the RF input of the optical transmitter

3.3.5.1- RF/Optical Parameters Option

You can use this option to set the type of input and the related parameters in the meter.

The screen displays four options for selection:

- Input signal: Selects the input type: Optical / RF
- Lambda: When the optical input is activated, it selects the lambda at which the measurement will be made: 1310nm, 1490nm or 1550nm.
- Optical drives: When the optical input is activated, it selects the type of units used: dBm, mW / µW or dB.
- Optical baseline: Displays the optical baseline. To select a new value, use the Set Optical Baseline option.



- Optical input settings -

3.3.5.2- Set Optical Baseline

This option sets the optical baseline.

3.4.- ERROR MESSAGES

When the equipment detects any unusual behavior in any of its modules or components, it advises the user of this fact, using the series of messages shown below:

- **FULL BAT.:**

  This message is shown when trying to restart the charging of a battery (press key over 3 sec.) that is already charged.

- **EXCESS TEMP.:**

  The equipment continuously monitors the temperature, and when it goes too high this message will blink on and off. ***If the temperature does not go down, the equipment will automatically turn off***. If the temperature goes down, the message will disappear.

  If this message appears, you should try to lower the temperature of the equipment. Operator action can range from relocating the equipment in a more ventilated spot through eliminating objects that may be obstructing its ventilation, to interrupting the charging of the battery (pressing key for over 3 sec.), etc. In the event that the message remains, it is a good idea to turn the equipment off, leaving the external powering connected, to ease the evacuation of the internal heat.

- **ERROR XXXX:**

  When the equipment turns on, it carries out a self-check of all its modules. When an anomaly is detected in any of them, the message ERROR appears, followed by a code. If this occurs, you should contact your Televés distributor, indicating the error code shown by the equipment.

- **CHARGER ERROR:**

  When the DC charger is connected to the equipment, it checks the voltage on the external power connector. If the equipment detects that the voltage is not correct, it advises the user with this error message that blinks on and off. The Ext. Sup. LED also blinks.

- **Vext.:**

  This error message occurs when selecting the voltage of the external units. When the equipment detects a voltage higher than that selected by the user in connector “F”; the message appears.

- **NO POWER:**

  This message appears when an attempt is made to start battery charging by pressing for over 3 sec. and there is no external powering.

- **SHORT CIRCUIT:**

  This error appears ***when the equipment detects a short circuit in the "F" connector***. In this case, the external unit power cuts off and automatic attempts at restarting are made every three seconds approximately.

- **LIMIT EXCEEDED:**

  This error message is generated ***when the power consumption in connector "F" exceeds the allowable maximum***. In this case, the external unit power cuts off and automatic attempts at restarting are made every three seconds approximately.

- **No DiSEqC. Vdc off:**

  This message appears ***when an attempt is made to select one of the DiSEqC inputs with the external unit power at OFF position***.

4.- INPUT AND OUTPUT DESCRIPTIONS

4.1.- RF INPUT

RF Input is carried out through the connector (RF connector) in the top panel.

The maximum signal level should in no case exceed 130 dbµV.

This connector can be easily replaced if deteriorated.

4.2.- USB PORT

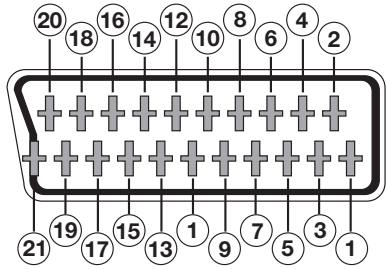
The **H45** has a USB port for data interchange with a PC.

- USB connector, type B -

The signals in this connector are as follows:

PIN no.	DESCRIPTION	CABLE
1	+5Vcc	Red
2	Data USB -	White
3	Data USB +	Green
4	GND (ground)	Black

4.3.- SCART (DIN EN 50049)



- Scart connector -

Also known as a PERITEL connector (in compliance with standard NF-C92250).

The signals in this connector are as follows:

PIN Nº	SIGNAL	SPECS.	PIN Nº	SIGNAL	SPECS.
1	Right ch. audio output		12	Digital bus interface	(N/C)
2	Right ch. audio input		13	Red grounding (R)	
3	Left ch. output output		14	Digital bus reserved	(N/C)
4	Audio grounding		15	Red output (R)	
5	Blue grounding (B)		16	Blanked signal	(N/C)
6	Left ch. audio input		17	Composite video gnd	
7	Blue output (B)		18	Blanked return	(N/C)
8	Switching voltage		19	Composite video output	
9	Green grounding (G)		20	Video input	
10	Digital bus interface	(N/C)	21	Connector shield grounding	
11	Green output (G)				

4.4.-SCART (Mini-DIN) Option

Depending on meter configuration, the device can be fitted with a Mini-DIN connector featuring the functionalities of the DIN EN 50049 connector.

4.5.- HDMI Option

Depending on meter configuration, the device can be fitted with an HDMI connector for video and audio output.

4.6.- OPTICAL INPUT Option

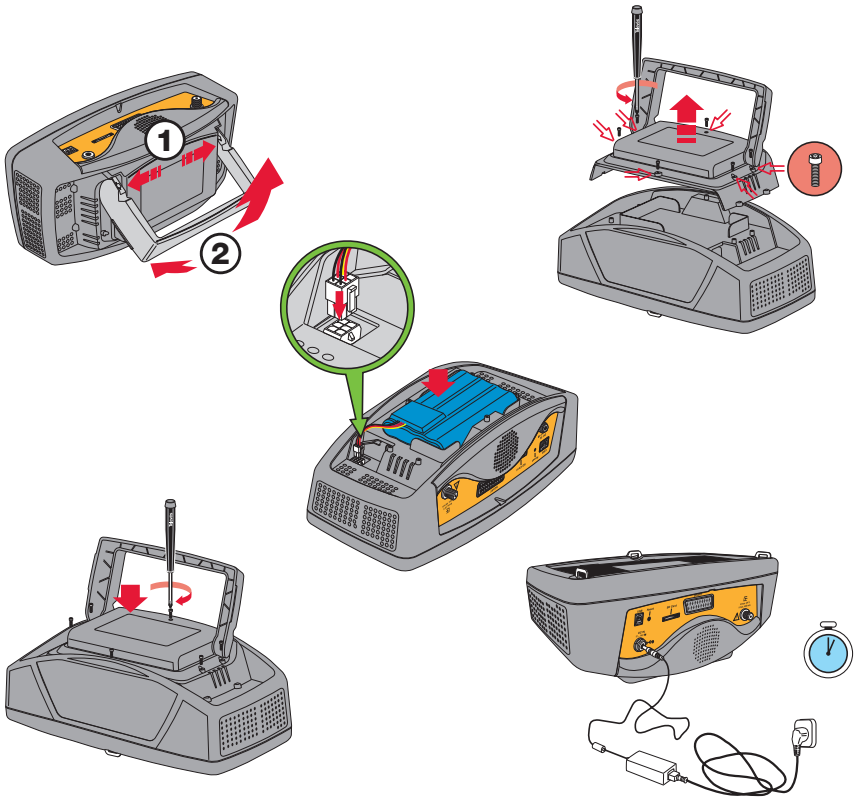
Depending on meter configuration, the device can be fitted with an FC/APC connector for optical measurements.

5.- MAINTENANCE

5.1.- BATTERY REPLACEMENT

The battery is due for replacement when, having been fully charged, its capacity is considerably reduced. To guarantee its proper functioning, it should be supplied by Televés, who should provide adequate protection for it.

For battery replacement, follow the procedure illustrated below:



⇒ *Turn off the equipment and disconnect the external power*.

⇒ Remove the rear cover of the equipment, unscrewing the six screws that keep it in place.

⇒ To remove the battery altogether, it should be disconnected from the connector within the meter.

Follow the cables from the battery to locate the connector. Press the flap to free the connector.

⇒ Place the new battery in the same position as the old one and plug the connector back in its socket.

⇒ Screw the rear cover back into position.

⇒ Update the battery change in the equipment software.

Precautions to be taken when replacing battery:

- Both when removing the battery from the equipment and when reconnecting it, make sure that the meter is turned off.
- If the battery is removed from the equipment, when it is replaced, make sure that it is properly reconnected.
- If metal tools are used for battery installation, the battery must be insulated, because a short circuit might occur.
- Do not connect the positive and negative poles of a battery with any metal item, since it could heat up, emit hydrogen gas, overflow, burn or explode.
- Only batteries supplied by Televés and adapted to your equipment may be used.

WARNING

Make sure that there is no risk of a short circuit in the cables leading from the battery since the high level of the current from it could cause serious damage to the equipment.

Do not omit to dispose of the battery in the containers provided for the purpose.

5.2.- CLEANING RECOMMENDATIONS

WARNING

To clean the housing, make sure the equipment is disconnected. Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These liquids can attack the materials used for housing construction.

Do not use alcohol or its by-products for cleaning the front panel, and especially not for cleaning viewing windows. These substances can cause mechanical damage to materials, reducing their lifespan.

The housing should be cleaned with a highly diluted solution of detergent in water, which should be applied with a soft, moist cloth.

Dry the equipment thoroughly before using it again.

5.2.1- CLEANING OPTICAL EQUIPMENT

Keeping all connectors on the optical meters/generators completely clean is necessary to ensure the quality of the measurements.

To do this, you should adhere to the following recommendations:

- Always keep unused connectors covered with the provided dust caps.
- Clean connectors frequently, especially after disconnecting/reconnecting or manipulating the connectors.
- Properly handle connectors and patch cords used.

- Fibre Cleaning Kit -

Before starting the cleaning process, make sure you have the following at hand:

– Isopropyl alcohol or a cleaning solvent specifically formulated to clean optical connectors.

– Cleaning Wipes.

– Cleaning swabs.

– Optical fibre cleaning polyester tape.

– It is highly recommended to have an optical fibre inspection microscope.

CAUTION

CAUTION. As with any other maintenance tasks, before cleaning the connectors, you should make sure the equipment is off.

Cleaning connectors/couplings:

Follow these steps:

- Remove the connector protective cap.

- Use a microscope to inspect fibre condition. If the fibre only needs cleaning, you can continue with the cleaning process, otherwise dispose of the fibre.

- Use a cleaning swab specifically designed to clean optical connectors. Do not touch the cleaning tip. Swabs are single use only. Do not reuse.

- Moisten the swab with isopropyl alcohol or a cleaning solvent specifically formulated to clean optical connectors.

- Carefully insert the cleaning swab into the connector and gently rotate clockwise.

- Remove the swab from the connector.

- Insert a new dry cleaning swab in the connector and then rotate carefully.

- Use the microscope to check the cleaning job.

- Cleaning connectors -

Cleaning the fibre ends

Follow these steps:

- Remove the protective caps.

- Use a microscope to inspect fibre condition. If the fibre only needs cleaning, you can continue with the cleaning process, otherwise dispose of the fibre.

a) Using cleaning wipes.

- Gently clean the fibre ends using wipes pre-moistened with isopropyl alcohol or appropriate solvent.

- Dry off by using a clean dry wipe.

- Cleaning with a wipe -

b) Using a polyester tape

- Advance the tape mechanism to have a fresh area of the cleaning tape exposed in the connector cleaning window.

- Slide the fibre on the window in the direction of the arrow.

- Use a microscope to check the cleaning job

- Cleaning with tape -

GUARANTEE

Televés S.A. offers a one year guarantee, beginning from the date of purchase for countries in the EEC.

For the batteries and due to the characteristics of this article, the guarantee period is limited to six months.

For countries that are not part of the EEC, the legal guarantee that is in force at the time of purchase is applied.

Keep the purchase invoice to determine this date.

During the guarantee period, **Televés S.A.** becomes position of the failures produced by defect of the material or manufacture.

The harm produced by improper usage, wear and tear, manipulation by a third party, catastrophes or any other cause beyond the control of **Televés S.A.** is not included in the guarantee.

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EN 61326-1: 2006: *Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements*

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EN 61010-1: 2001: *Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements*
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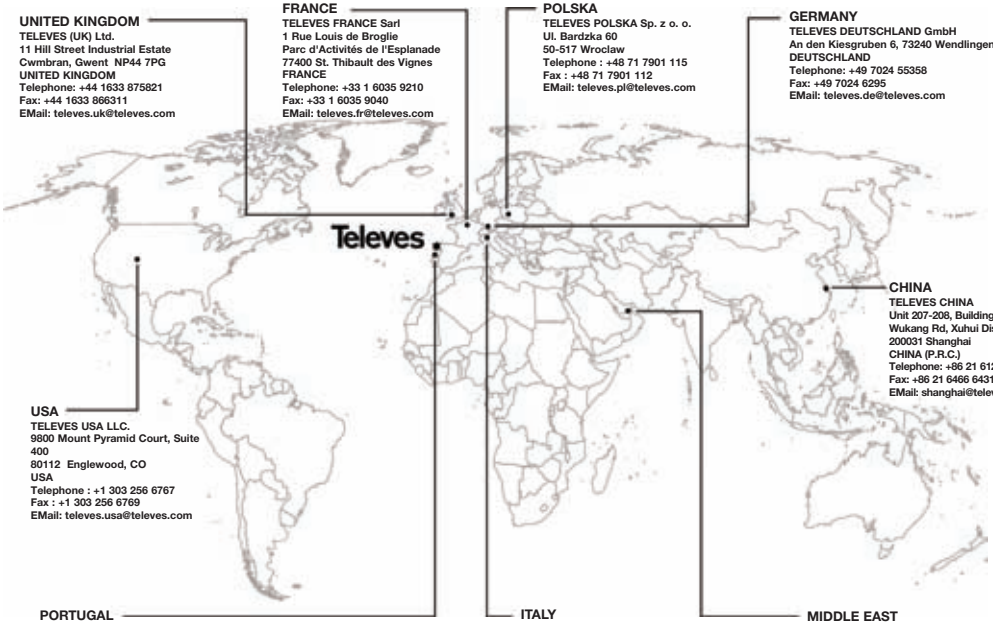

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